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VIEWS, NEWS AND INTERVIEWS.

"Do you realize," said the man with the bulging forehead, "what electricity has done for the street-car passenger? Just think a moment of this trio of successes: Electricity now furnishes the power, replacing the horse and mule; it now furnishes the light, replacing the ill-smelling oil lamp; it now furnishes the heat, replacing the dangerous stove and suffocating coke. And all this at one and the same time from the same current in the same car. Great is electricity!"

The Brooklyn Bridge trolley cars are a pronounced success. The only criticism made so far is that they are too much of a success—too many people want to ride on them at the same time!

The new office boy in the reporter's room of a Philadelphia paper was sent for a bucketful of electricity. He didn't return. But if he had only been wise enough and gone to the Electric Storage Battery Company in that city he might have turned the tables on the Philadelphia reporters.

An ingenious stage waterfall, devised by M. Gailhard, has attracted attention at the Paris opera balls, according to a daily paper. It is made of tulle, stretched on frames imitating the curves of a fall. Behind it little streams of water are discharged through perforated pipes against a metal plate, so as to throw a spray upon the tulle. When the electric light is played on this the effect is magical.

The Edison three-wire patent will expire in two years—in March, 1900. This patent is one of the few that have been almost universally recognized and respected, and it is believed today that there is not an infringer in North America. It was not taken out in European countries. It proved to be worth millions to the Edison electric lighting interests, and is supposed to have had great weight in bringing into consolidation and patent agreement parent electrical manufacturing companies.

Electric storage battery cars are to be tried again in New York city. They will run on a cross-town line on Grand street across the borough of Manhattan from the East to the North River.

"Will you kindly give me the names of New York city, Boston and other firms dealing in electric light stock and bonds? I wish to bond my plant." Thus writes a correspondent. If our financial friends will write us, the ELECTRICAL REVIEW will forward their communications.

An interesting fact in the instrument report of the American Bell Telephone Company for the month ended February 20, 1898, is the statement that shows gross output, 25,897; returned, 12,790; leaving the net output for the month, 13,107. As two instruments are required for every subscriber—a transmitter and a receiver—this would mean, if these were for subscribers' use, an increase in Bell telephone stations of over 6,500 for the month.

A director of Manhattan Elevated says: "Negotiations looking to electric equipment and with reference to extensions are proceeding as rapidly as could be expected. Every point has to be gone over carefully, and after a matter is settled it often has to be reopened on account of the bearing which something else may be found to have on this particular point. All interests are doing their best to overcome difficulties and to discover what is practicable and wise."

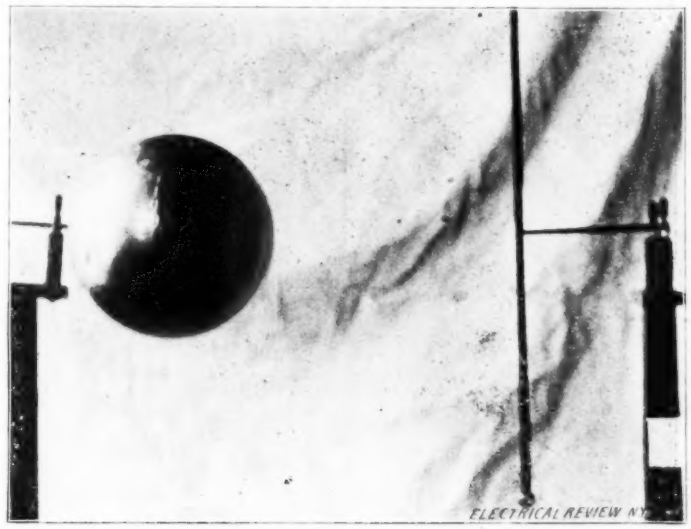

FIG. 1.—"POWERFUL ELECTRICAL DISCHARGES."—1,200,000 VOLTS DISCHARGED BETWEEN A SPHERE ONE FOOT IN DIAMETER AND A STRAIGHT ROD.

FIG. 2.—THE DISCHARGE FROM THE SPHERE.

POWERFUL ELECTRICAL DISCHARGES.

BY JOHN TROWBRIDGE.*

The study of lightning has now assumed a practical bearing, for our cities are covered with a network of wires, many of them carrying strong currents. In certain cases the strong electrical disturbances in the atmosphere, such as are prevalent in thunder-storms, tend to short-circuit such currents by leading them through electric sparks in such a manner as to burn out electrical connections and thereby to produce conflagrations. In the case, too, of powder magazines and the modern war ships, the subject of the behavior of lightning possesses great practical interest.

The behavior of powerful electrical discharges, four feet and more in length, has therefore interested me greatly. When a single discharge occurs between a metallic sphere one foot in diameter and a straight rod, arranged as shown in the accompanying photograph, Fig. 1, it is seen to consist of one white dazzling spark, accompanied on the surface of the sphere, Fig. 2, by a brush discharge of a peculiar forked nature, and by similar discharges from the entire surface of the vertical rod which constitutes the other terminal. The discharges are at right angles to the surface of the sphere and that of the rod, and therefore coincide with the lines of electrostatic force.

There does not appear to be a great difference between the brush discharge from the sphere whether it is made positive or negative. The negative brush discharge appears to be more actinic, and suggests the possibility that X rays may be present, even in air, when powerful electromotive force is used. The electromotive force used to produce the appearance represented in the photographs is 1,200,000 volts.

I have discovered that liquid resistance in glass tubes can not be used with this high force; for a spark

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passes from one terminal to the other over the surface of the liquid inside the tube and breaks the tube. I have obtained in this way sparks three feet long inside of tubes one inch in internal diameter filled with distilled water. When similar tubes are filled with a weak solution of sulphate of copper a spark will also pass over the surface of this liquid when the resistance of the column of liquid exceeds 1,000 ohms. The terminals in both these cases consisted of platinum disks which filled the bore of the tube. I next took an open vessel filled with distilled water and dipped the terminals in it, the terminals in this case being wires. Here, again, the spark passed over the surface of the water, and this was also the case when the open vessel was filled with the weak solution of sulphate of copper, and when the wires were at a suitable distance apart. At a still greater distance apart, a curious phenomenon was witnessed—both wire terminals became luminous under the surface of the liquid. It seemed as if the discharge occurred as a surface action passing up the wires, which were covered with cotton, and then over the surface of the liquid. This surface action is diminished by employing large plates as electrodes, or at least it is not so visible; and the importance of large earth plates for lighting conductors is suggested.

The same phenomenon was witnessed when a wet rope was strung between the terminals of the machine. A powerful spark followed the surface of the rope, and could be thus directed through the air between the terminals. This surface action can be shown in a splendid manner by coating a board with shellac and then covering the shellacked surface with black-lead and polishing the surface. The resistance of such a surface several feet square, with electrodes of platinum or copper bands, can be made comparatively low; for instance, 1,000 ohms. When the discharge of the nature I have mentioned passes across such a surface, it makes it a sheet of flame. This surface action, under the effect of great electromotive force, shows that the initial resistance of the air to such discharges is low. It is possible that with still higher electromotive forces the initial resistance of the air will still further decrease. I hope to experiment shortly with a voltage of 3,000,000.

New York capitalists are interested in an electric railroad from South Glens Falls to Saratoga it is reported, and have agreed to subscribe for bonds and money necessary.

ELECTRIC RAILWAY NOTES.

The passenger receipts of the Brooklyn Rapid Transit Company for February amounted to $385,967, which is $25,000 in excess of the receipts for the corresponding month last year.

The car barns of the Menominee, Mich., Street Railway Company have been totally destroyed by fire, together with their contents, entailing a loss of $35,000, partly covered by insurance.

The report of the Nassau Electric Railroad, of Brooklyn, for the quarter ended December 31, shows: Gross earnings, $430,702; operating expenses, $260,675; other income, $30,623; fixed charges, $196,178; net income, $4,472; deficit for corresponding quarter of last year, $28,088.

It is reported that the Northeast Electric Railway Company, of Kansas City, Mo., has decided to expend $100,000 this Spring for a new track, new cars, an increase in the power facilities of its electric plant and repairs on the old, or perhaps a new, viaduct at Agnes avenue; but no extensions will be made at present.

The report of the Metropolitan Street Railway Company, of New York city, for the quarter ended December 31, shows: Gross earnings, $2,383,458; operating expenses, $1,208,769; other income, $150,918; fixed charges, $789,006; net income, $536,600; net income for corresponding quarter of last year, $418,116; cash on hand, $1,163,807; profit and loss (surplus), $1,737,198.

The regular quarterly report of the Glens Falls, Sandy Hill & Fort Edward, N. Y., Street Railroad Company, for the quarter ended December 31, shows:

	1896.	1897.
Gross earnings	$13,414	$15,345
Operating expenses	7,501	9,819
Net earnings	5,913	5,526
Fixed charges	2,467	2,736
Net income	3,446	2,790

The general balance sheet shows assets of $314,654, including $301,170 for cost of road and equipment, and $8,018 cash on hand. The liabilities include $149,000 capital stock; $137,500 funded debt, and $9,619 profit and loss (surplus).

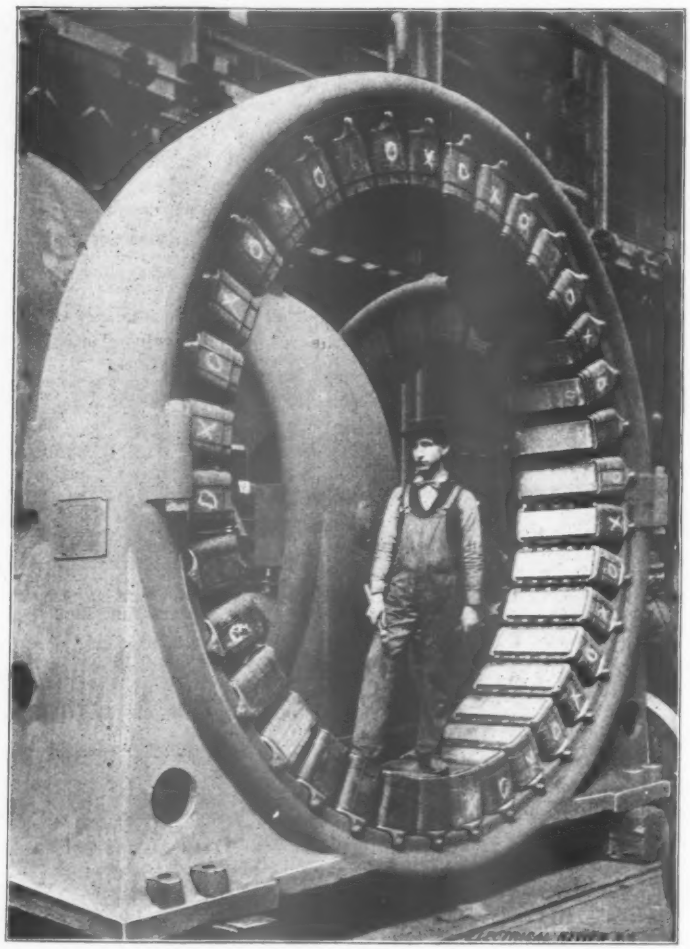

FIG. 1.—VIEW IN WESTINGHOUSE FACTORY, PITTSBURGH.—FIELD OF LARGE ENGINE TYPE ALTERNATING-CURRENT GENERATOR.

WESTINGHOUSE APPARATUS.

INTERESTING VIEWS IN THE FACTORY OF THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY.

The important and advanced product of the great electrical factories is always attractive to the layman, and of special interest to those acquainted with the detail that enters into its manufacture. There is probably no factory in the world better fitted for turning out high-grade modern apparatus than the great establishment founded by Mr. George Westinghouse at Pittsburgh. Three interesting views, taken exclusively for the ELECTRICAL REVIEW at these works, are presented in this issue. They give an idea of the size and magnitude of the work that is constantly being carried to completion here. The caption to each illustration will tell our readers the story without further description.

A THEORY IN REFERENCE TO THE ORIGIN AND CHARACTER OF X RAYS.

BY GEORGE ADAM, M. D.*

The reading of Thompson & Anthony's book on "Roentgen Rays and Phenomena of the Anode and Cathode" has led me to write the following article.

Jean Perrin enunciated the following theory in reference to cathode rays: That there being an intense electric field in the vicinity of the cathode, some of the molecules of residual gas are torn into ions. The negative ions start towards the positive pole, but gaining sufficient velocity they go outward in straight lines independent of the anode. The positive ions move toward the cathode. Accepting this hypothesis, the writer would extend the theory in explanation of X-ray phenomena. Supposing we have a residual gas such as carbonic acid ($C O_2$). Disintegration takes place at the cathode, the carbon seeking the cathode, the oxygen starting for the positive but acquiring an enormous velocity which is capable of overcoming the attraction of the anode, if that pole is not directly in its path.

The oxygen ions are electrified by the current.

The forces, therefore, that are active in this stream of oxygen which forms the cathode rays are as follows:

A large kinetic potential, an electric charge, an atomic attraction or

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adhesive force, and an atomic separative force owing to the high exhaustion of the tube and increase of intermolecular space. To what extent do these forces act together and to what extent do they oppose each other? I would reason that the electric charge would strengthen the atomic adhesion and thus keep the atoms in a molecular state, whereas the velocity and the rarity of the gas would act in the opposite direction to separate the atoms and break up the molecule.

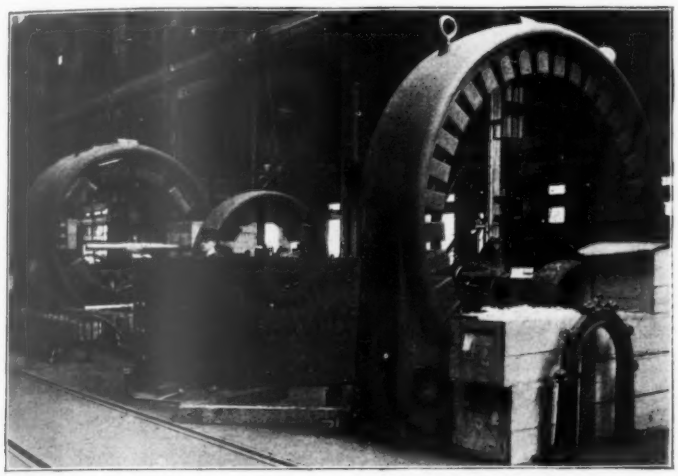


FIG. 2.—VIEW IN WESTINGHOUSE FACTORY.—LARGE CASTINGS FOR ELECTRICAL APPARATUS OF THE W. E. & M. COMPANY.

The characteristics of the cathode rays prove that the molecular condition is maintained. The chemical action, therefore, that would take place at the cathode is represented thus:

$$(C\,O_2)_2 = C_2 + (O_2)_2$$

and the cathode rays would be represented by the formula

$$O_2 + O_2.$$

It will be well here to consider the relationship of an electric charge to atomic adhesion. An electric current passing through a solution of a substance whose atomic constituents have different polarity will produce molecular disintegration, but there is no evidence, however strong the current, that atoms of the same polarity would be separated. On the contrary, atomic adhesion is a form of magnetism, which latter obeys similar laws as electrification and may be identical. Or it may be stated thus: that it requires positive and negative electricity to produce molecular disintegration in the electrolyte. In this instance, the oxygen molecules are acted on by the negative electricity of the current.

The cathode rays bombard the fluorescent spot as molecules.

What do the cathode rays lose at the bombarded spot? They lose their electric charge. This is proved by the difference of the action of X and cathode rays in charging and discharging bodies. Do they lose any of the velocity? No, because there must be a reverse stream from the bombarded spot to establish an equilibrium in the exhaustion of the tube. This reverse force acts only at the commencement with the X-ray stream.

Then what forces are active in this stream of radiant energy as it leaves the bombarded spot? The kinetic force, the separative force owing to the increased intermolecular spaces, and the atomic adhesive force (assuming that this last is a magnetic force, some of it may also have been lost in the bombardment).

We have, then, two disintegrating influences, capable of overcoming the one adhesive force, and as a result, the molecule is torn to pieces. Issuing then from the bombarded spot is a stream of atoms, in this case of oxygen, with an immense kinetic potential and intense chemical potential. The formula would be

$$O + O + O + O.$$

The stream is sent out in straight lines from the bombarded spot, the same as the cathode rays issue from the cathode.

Let us consider some of the characteristics of the X rays, and see if they can be accounted for by our atomic theory. The penetrating power of atoms must necessarily be greater than that of molecules, and in this respect comparison with other radiant energies supports our theory. The penetrating power would be different in different media, owing to chemical action, and as the stream would decrease in velocity, the chemical action would assert itself.

Would not the bad effects produced by long exposure to X rays be accounted for by the chemical action of the atoms on the tissues? Having lost its electric charge, and, perhaps, some of its magnetic adhesive force, such a stream of atoms would not be expected to be influenced by a magnet, but being *infra normal* in this respect, when passing through a body, would draw magnetism from the body, even if the latter was in state of zero. This would account for the rays being incapable of charging a body electrically, and of its power to discharge a body already charged.

The X rays are not generated in Geisler tubes, because the intermolecular spaces are not large enough to assist in the work of disintegration of the molecule, and we have, in that case, a molecular stream.

In reference to Righi's experiment, showing that bodies in the neutral state were positively electrified by X rays, I would offer this explanation:

The X rays take away negative electricity from such a body and leave the latter positively electrified by the body's own electricity.

Thompson's experiment showing that the penetrating power of X rays varies with the vacuum—that is, the higher the vacuum within certain limits the greater the penetrating power—may be explained in this way: the enlargement of the intermolecular spaces is followed by a greater interatomic space in the stream. As the rays meet resistance the space between the atoms becomes smaller, and when the space is entirely obliterated the atoms unite and form molecules.

It follows that the larger the space, the longer the time it will take to obliterate it, and, therefore, the greater the distance traveled. This explanation would also account for there seeming to be two or more kinds of rays differing in penetrating power.

Such a ray as described, which we might call the atomic ray, would not be expected to be found in sunlight, nor any artificial light known, and the X ray is not so found.

Radiant energy consisting of a stream of atoms would be a real ray, and would not be characterized by refraction, diffraction or interference phenomena, such as wave motion is, and no such characteristics have been found in X rays.

A stream of molecules or particles would not be expected to produce all the phenomena characteristic of a stream of atoms, and accordingly we find no known real ray obeying the same laws as the Roentgen ray.

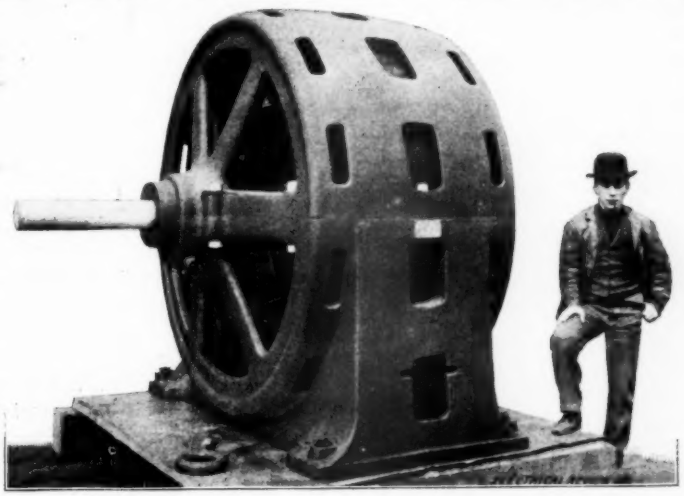


FIG. 3.—VIEW IN WESTINGHOUSE FACTORY.—500-H.-P. TESLA POLYPHASE INDUCTION MOTOR.—LARGEST INDUCTION MOTOR EVER MADE.

New Trolley Lines in Chicago.

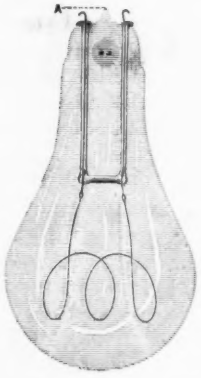
There will soon be more trolley lines in Chicago, if the City Council grants permission to the Chicago City Railway to build 14 miles of new lines in the territory lying between Sixty-ninth street south and Eighteenth street north. All of these lines are merely extensions of or connections with existing lines, and it is expected that some discussion will arise in the council over the rate of compensation to be fixed for the new lines, some claiming that it will be very hard, or even impossible, to fix any rate for the new lines as separate from the lines now in use.

The penetration of Hyde Park by the proposed feeder lines is regarded as an attempt to take away some of the Illinois Central's suburban business, especially if the company succeeds in getting an elevated entrance to the downtown portion of the city by means of an "L" in Dearborn street.

Description of a Recent Patent for the Manufacture of Incandescent Lamps.

It has been considered desirable for many years to produce an incandescent lamp in some manner that would do away with the necessity of the tip at the top of the bulb. Lamps have been produced in this manner in Europe for some time, but it has been found almost impossible to produce a satisfactory lamp of the tipless variety in this country on account of the character of the glass used. While the glass used in the German lamps is a lime glass, the glass used in the American lamps is what is known as a lead glass.

There are many objections to overcome in making a lamp in a tipless bulb. It has been tried to make the lamp in the ordinary way, except the tubulation, controlling the bulb with a holder, and then tubulating the lamp on the flange of the stem. This, however, thickens the glass at the point where the lamp is tubulated and, it is said, makes an uneven contraction and expansion which causes a large percentage of the lamps to crack.



IMPROVED SHELBY INCANDESCENT LAMP.

The platinum wires have also been forced through the side of the bulb and through the ends of the bulb, and sealed in without any re-enforcement, and where this has been done there has not been a sufficient thickness of glass around the wires to make a perfect seal. Although the lamps might show a good vacuum when taken from the pumps, they would soon leak, and consequently the life of the lamps would be lost. All of these difficulties were experienced by the Shelby Electric Company. In fact, they tried 22 different ways to make a tipless-bulbed lamp, and found none of them practical until the method illustrated and described was discovered.

The Shelby Electric Company claim many advantages on this style of seal, among them being the fact that the leading-in wires are insulated throughout their entire length, and are kept so far apart that it is impossible for the lamps to arc. Dampness, also, is very detrimental to the ordinary tube-sealed lamp, but when the leading-in wires are protected by glass insulation dampness does not affect them.

The tip of the lamp marked "A" not only permits of the lamp being sealed with the glass of the bulb itself, but actually forms a water-shed, so that, instead of the moisture having a tendency to accumulate between the leading-in wires, it is thrown to the outer edge of the base. Lamps of this design are claimed to be superior for high voltages and for damp places, and the absence of the tip certainly makes a lamp which is neater in appearance than the tipped lamp.

Large Printing Presses Operated by Direct-Connected Electric Motors.

The Bullock Electric Manufacturing Company, of Cincinnati, Ohio, makers of the well known Bullock type of electric motor for belted, stationary and direct-connected service, have devoted especial study and attention to adapting the electric motor to driving printing presses for newspaper and magazine work. In the illustrations herewith are shown several large presses equipped with Bullock motors.

In Fig. 3 is shown a sextuple press with color attachment run by a direct-connected Bullock motor. This is part of the equipment of W. R. Hearst's San Francisco *Examiner* plant, which includes 10 Bullock

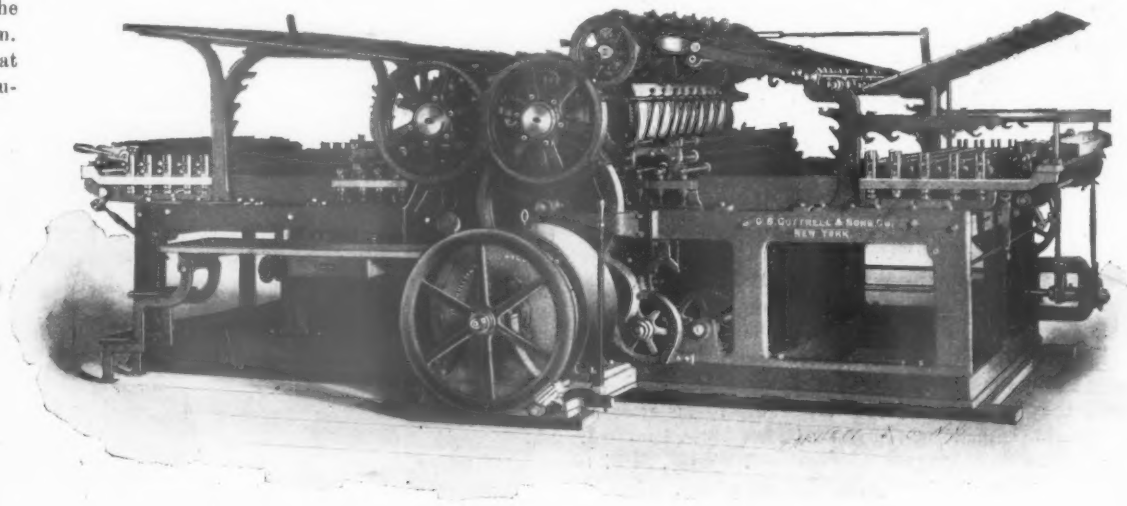


FIG. 1.—BULLOCK MOTOR DIRECT-CONNECTED TO COTTRELL MAGAZINE PRESS.

direct-connected motors supplied with current by six 70-horse-power Bullock engine type dynamos. The press illustrated will start with 30 per cent of the current required to run it at full speed. The large and sudden drain of power usually incident to starting a press is said to be entirely overcome. Such an advantage is important in many cities where the central stations will not allow large presses to use their power lines because of the unusual demand for current at starting. The press shown in Fig. 3 can be started slowly, inched along, and run at a variety of slow speeds. The speed may be varied at any time without the slightest jerk or jar of the press.

The pressure of a button instantly stops the press, which is a great convenience in case the paper from any

Electric Lighting Effects at the Omaha Exposition.

The illumination of the grounds and buildings of the great exposition for which Omaha, Neb., is now preparing will be made on a scale of magnificence unexcelled even by the wonderful effects obtained at Chicago in 1893. The fact that Mr. Luther Stieringer, the lighting expert of the World's Fair, is consulting electrician for the Omaha Exposition Company, is a guarantee that the lighting effects will be of a character in keeping with the scope of this great Trans-Mississippi exhibition.

Not less than 2,155 kilowatts in dynamos and transformers have already been ordered from the General Electric Company for purely illuminating purposes. In detail, the contract covers four 125-light, 2,000-candle-power Brush arc dynamos of the multi-circuit type; four 120-kilowatt and two 180-kilowatt alternating current, high periodicity dynamos, operating at 1,040 volts, together with 840 kilowatts in type H transformers of different sizes. Current for various power purposes will be supplied from a generator of 225 kilowatts capacity operating at from 500 to 550 volts.

The arc lamps will number 6,000, of 2,000 candle-power each. These are to be of either the double or single carbon type, at the option of the Brush Electric Company, but if the latter are used they are to be arranged for 14-hour service. The contract also calls for the necessary exciters and all the switchboard appliances for the operation of the above machines.

The Little Lady and the Telephone.

[*New York Journal.*]

There are bells galore in Gotham
Making music all the time;
They are brazen, they are golden,
And they peal in merry chime;
But to only one I listen—
One that's mine, and mine alone;
She's the belle of Central Office,
And she rules my telephone.

With the sweetest little,
Neatest little,
Fleetest little ring,
That echoes through my office
In a mellow ting-a ling;
She tells me that she wants me,
And all cares aside I fling,
As I swiftly fly to answer
My 'phone belle's little ring.

She's a dainty, dimpled darling,
And she sets my heart afire
When her words in shyest whispers
Lightly flit across the wire;
And I swear that no bell ever
Had so musical a tone
As the belle that "rings up" daily,
And calls me to the 'phone.

Oh, that queerest little,
Clearest little,
Dearest little ring!
What visions rise before me
When I hear its ting-a-ling!
What dreams of bliss unending
Its mellow echoes bring,
As with happy heart I answer
My 'phone belle's little ring!

one of the rolls tears or anything becomes caught in the press.

The motor illustrated in Fig. 2 is very slow speed, and its characteristics are such as to enable it to exert a starting torque, said to be three times its running torque. The Bullock Electric Manufacturing Company claim to be pioneers in this work. The motor shown can be applied to the press in any position, but the usual method is to suspend it from a floor beam below the press, connecting it to the driving shaft of the press by a gear and pinion.

In Fig. 1 is illustrated a Bullock motor, direct-connected to a magazine press. This is of the Cottrell perfecting type, and forms a part of the plant of W. Buxenstein, at Berlin, Germany. The Bullock company has just sent to the New York *World* an 80-horse-power, 120-volt motor, to operate the largest printing press ever built.

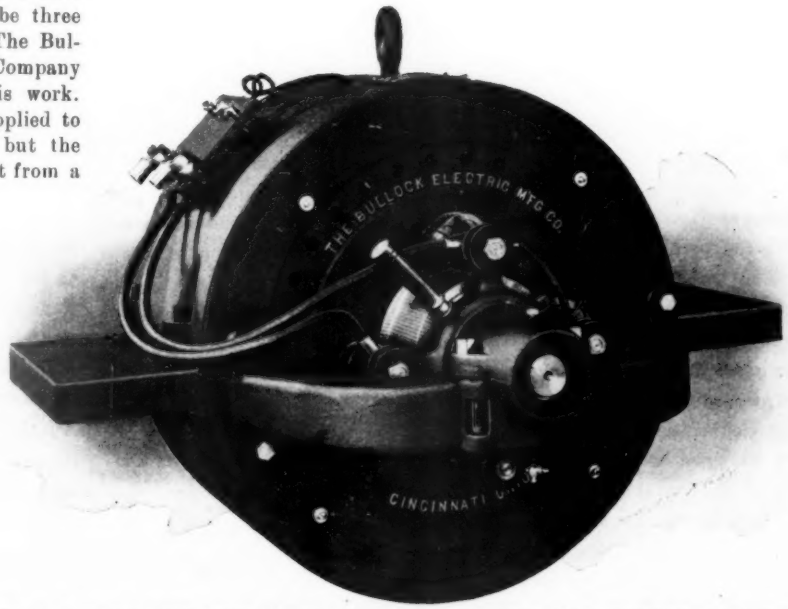


FIG. 2.—BULLOCK SLOW-SPEED MOTOR, SPECIALLY ADAPTED FOR WORK WITH PRINTING PRESSES.

A few of the prominent newspapers that are being printed on presses driven by Bullock motors are the following: New York *Journal*, three Hoe sextuple and one Hoe multicolor presses; New York *Sun*, four Hoe presses; New York *Herald*, three Hoe and one Goss; New York *World*, one Hoe multicolor. A number of magazine and book printing establishments have also installed Bullock apparatus in connection with their printing plant, such as the American Book Company, Frank A. Munsey and the Textile Publishing Company.

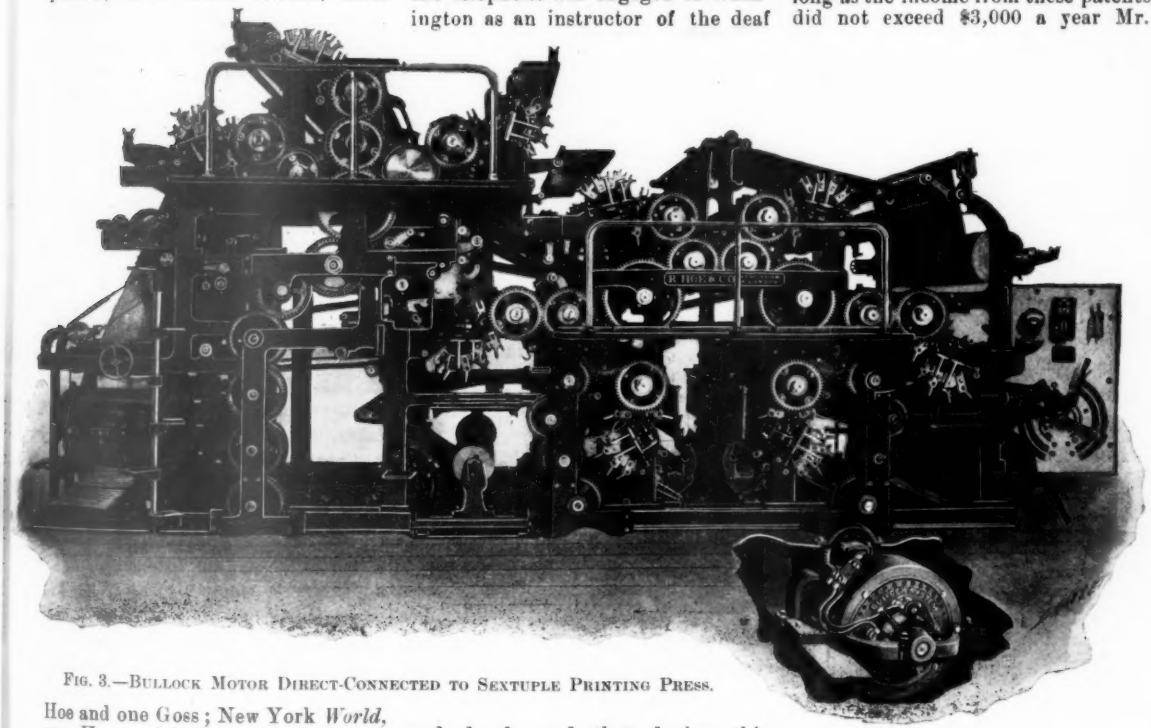


FIG. 3.—BULLOCK MOTOR DIRECT-CONNECTED TO SEXTUPLE PRINTING PRESS.

A Contract Between Professor Bell and Gardiner G. Hubbard.

A suit commenced in Washington, D. C., on February 25, to secure for Mrs. Alexander Graham Bell her interest in a trust fund of $200,000, reveals a romantic story involving the telephone. It is generally known that Professor Bell before inventing the telephone was engaged in Washington as an instructor of the deaf and dumb, and that during this period he became acquainted with Miss Hubbard, who was one of his pupils, and a daughter of the late Gardiner G. Hubbard.

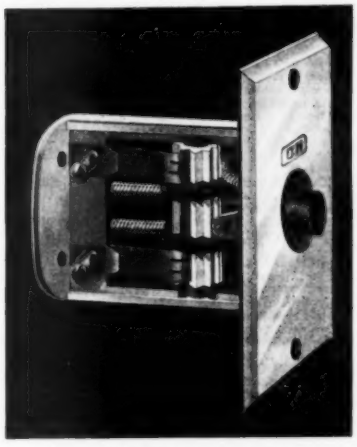
Professor Bell became engaged to Miss Hubbard, but before their marriage he entered into a contract with Gardiner G. Hubbard to provide for the creation of a trust fund, of which Professor Bell's wife was to be the beneficiary.

Professor Bell conveyed all his interests in his telephone patents, both at home and abroad, to Mr. Hubbard to hold in trust for Mrs. Bell. As long as the income from these patents did not exceed $3,000 a year Mr. Hubbard was to pay it to Mrs. Bell. It was provided that when the revenue exceeded $3,000 a year the excess should remain in Mr. Hubbard's hands until it reached the amount of $200,000. After this it was to be held as a trust fund, and the total income was to be paid to Mrs. Bell. The trust was to continue during the life of Mrs. Bell, and at her death to go to her children, or, if she had none, to Professor Bell.

The contract was executed on July 9, 1877, and Professor Bell and Miss Hubbard were married. It now seems that Gardiner G. Hubbard's will provided that his entire estate should go to his widow in fee simple without any qualifications. It was discovered after his death that the trust fund amounted to $259,798. Mrs. Alexander Graham Bell, therefore, under the terms of the trust, believes herself to be entitled to $59,798 at once as the excess over the $200,000 provided for in the trust. The suit referred to above is brought to determine this.

A New Push-Button Switch.

It is probably a fact that the use of the old-fashioned turn switches is rapidly decreasing, the neater and more elegant form of flush push-button device being more and more adopted. While there are quite a number of such switches on the market to-day, many, if not all of them, are lacking in some one detail to make it the ideal form of switch, meeting alike the requirements of the contractors, underwriters and users. The New York push-button switch, recently placed on the market by M. B. Austin & Company, Chicago, seems to combine all the desirable points that can possibly be expected in a switch of this kind. The working parts are made entirely of glass and metal, and make the switch fireproof as well as damp-proof. It is also non-arcing, all contacts being perfectly made, and it is easily connected. One of its most important features, however, consists in the single button with which it is operated, and an indicating dial, showing at a glance whether the switch is on or off. This latter feature is no doubt very desirable, particularly in places where lights are operated in rooms other than the one in which switches may be located.



AUSTIN PUSH-BUTTON SWITCH.

Messrs. Austin & Company have issued descriptive pamphlets fully describing this device.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, MARCH 9, 1898.

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It is a good time to have your electric fan cleaned and oiled, and to order another one.

The telegraph tournament to be held during the Electrical Exhibition in New York next May is attracting the attention of our expert operators. There is an opportunity to win fame and distinction in this contest that is sure to bring out the best ability in the fraternity. The ELECTRICAL REVIEW hopes to see the different sections of the country well represented.

LEGISLATION AND TELEPHONE RENTALS.

The usual legislative agitation of the question of telephone rates is now at its height. We do not believe that the large majority of telephone users of the country favor the reduction of telephone rentals. In fact, we believe it is a very small minority and chiefly persons who have but little use for this modern business essential. What the average telephone user desires is the best and most improved service at reasonable expense and, with one or two exceptions, that is what is given to the users of the telephone in all large cities and commercial centers of the United States.

A particular case in support of the above has just occurred in Ohio. There is the usual bill before the Ohio Legislature, known as House Bill No. 130, which proposes to reduce telephone rentals in that state. A remonstrance, signed by the telephone users of Cincinnati and suburbs, has been sent to the Senate and House of Representatives at Columbus and is in the following language:

"The undersigned, subscribers and users of the telephone in the Cincinnati Exchange district of the City and Suburban Telegraph Association, respectfully represent that House Bill 130, purporting to reduce rates for telephone service, would, if enacted, impair or destroy that service, which is as delicate as it is valuable and dependent upon many conditions of good management, and that such legislation would be adverse to our interests as subscribers."

This remonstrance is signed by the leading men and corporations and business houses of southern Ohio, and many of the signatures represent from two to forty exchange telephones. The number of names of subscribers signed to the remonstrance is over 2,000, and we are reliably informed that more than 96 per cent of all the subscribers of the City and Suburban Telegraph Association have distinctly expressed their disapprobation of this proposed legislative interference with the telephone service.

We think if the gentlemen who are representing the people in the various legislatures will investigate a little beneath the surface, they will find that there is no general desire to cripple the telephone service of the country by legislative enactment.

There is a great outcry in the Legislature at Albany about the rental of $240 per annum charged in New York city. Less than 10 per cent of the users of the telephone in this city, we are informed, pay that rate, which is for special service, and it is entirely voluntary with them.

We believe the message rate system, which is now in force in this city and extending throughout the country, is the proper solution of the telephone question which seems to so regularly vex the minds of a few of the overzealous and uninformed senators and representatives in the legislatures of the different states.

The question as to the legal and proper treatment of sick passengers in street railway cars has always been a source of annoyance to the street railway manager. The Appellate Division of the New York Supreme Court recently laid down a pretty severe rule regarding sick passengers. The decision was rendered by Justice Adams in the case of Montgomery against the Buffalo Railway Company. The plaintiff, who was a passenger on one of the defendant's cars, paid his fare and stood on the rear platform of the car. The conductor informed him that the company's rules forbade passengers standing on the platform. The plaintiff, however, insisted on remaining where he was, because he was suffering from nausea. The conductor then ejected the plaintiff from the car, using no more force than was necessary. A majority of the court held that the conductor did right as a matter of law, but Justice Green delivered a strong dissenting opinion, in which Justice Hamilton Ward concurred. They thought that the question as to whether the enforcement of the rule against the plaintiff was reasonable or not was one of fact to be determined by a jury. The view of the minority of the court was that the act of the conductor was in disregard of decency, humanity and common civility. "The place selected by the passenger," said Judge Greene, "neither annoyed nor inconvenienced any one, and he should have been allowed his temporary purpose of gaining relief from his illness, and avoiding the discomfort which might have resulted to the other passengers had he remained in his seat."

The brightest men in America are the general passenger agents of our great trunk lines. It is required in their business. Recently General Passenger Agent Geo. H. Daniels appeared before a committee of the United States Senate, and the learned solons were told more about the passenger business of railroads in about an hour than had come to them in all their previous existences, and two of the Senators had to retire defeated when they attempted to combat the arguments of the railroad man. Another case illustrates the wise discernment of General Passenger Agent O. W. Ruggles, who quotes, in his handsome time-table, from the ELECTRICAL REVIEW a description of a scene on one of his roads. This is proper appreciation, and shows that honor from a high source occasionally comes to the deserving journal.

TESLA'S ORIGINAL WORK.

[*From the London Electrical Review.*]

In a letter to the ELECTRICAL REVIEW, New York, Tesla describes the results of some recent experiments he has made in vacuum tube lamps, and in their application to photography and other purposes. Along with the letter are published copies of photographs taken with Tesla's new vacuum. One is a portrait taken by the light of a single vacuum lamp at a distance of five feet with an exposure of five seconds. Another is a page of letter-press taken by a single vacuum tube at a distance of four feet with an exposure of two seconds. The photographs are not equal to sunlight photographs, but resemble more those taken with a single magnesium flash-light, the shadows being very harsh, but the amount of detail is considerable. * * * The great superiority in efficiency of his system over earlier attempts at vacuum tube lighting he considers is principally due to the use of his improved apparatus for "producing economically harmonical electrical vibrations of extreme rapidity," referring, no doubt, to his oscillator recently described in the *Electrical Review*. Tesla promises soon to give further details of his system. The well known originality of nearly all Tesla's investigations leads us to look forward to the publication of the full description of his new system.

Wall Street and the Electrical Stock Market.

The stock market during the past week has been largely "professional." Technical conditions have undergone little change since last week. Briefly stated, the market has been left in the hands of professional traders. The fear of Cuban troubles dominated the market throughout the week, and four-fifths of the traders were inclined to sell stocks on rallies.

Specific news likely to affect the values of individual electrical stocks was both meager and without noteworthy influence. General Electric was moderately traded in. The stock touched 35 on Tuesday, and fluctuated within a range of 2½ points throughout the week, touching 32⅝ on Friday. No news of the company's condition transpired, but it is understood that interesting developments may be announced at an early date. The debenture five per cent bonds sold at 101¼.

Edison Electric of New York consolidated 5's sold at 116 and the first 5's at 111½ to 109½, ex-interest. The Brooklyn company stock changed hands at 108¼.

Western Union was without feature, following the course of the general market and fluctuating between 86½ and 88. The statement for the quarter ending March 31, which is soon to be published, will, it is said, show a very fair improvement over last year.

North American was practically neglected, the total week's sales being barely in excess of 2,000 shares at 5½ to 5¾.

Commercial Cable declared the usual quarterly dividend of 1¾ per cent, payable April 1.

For the year ending December 31 the New York & New Jersey Telephone Company earned gross $1,790,287 and net $553,467, an increase of $75,736. Surplus after charges and dividends increased $54,642, bringing the total surplus up to $1,528,646.

The Hudson River Telephone Company earned during the year ended December 31 over five and a half per cent on its capital stock. Gross receipts were $335,038 and net $113,917. The company has done a large amount of construction work during the year in the covering of new territory and the rehabilitating of old lines.

Dealings in electrical stocks on the Boston Exchange were light. Prices however showed advances for the week, the largest gain being made by American Bell Telephone which sold up 6½ points to 262½ on Friday. Erie Telephone opened at 67, sold at 68½ Tuesday, closing at 68. General Electric preferred gained 3 points to 93 losing all the advance in subsequent trading and closing at 89. New England Telephone advanced 4 points to 130 Thursday, reacting 1½ points on Friday, closing around 128.

On the Philadelphia Exchange Electric Storage Battery common sold at 19½ Monday, 21½ Wednesday and closed at 21. The preferred gained 1¾ points to 24, reacting to 23 on Saturday. Pennsylvania Heat, Light, and Power gained 1 point to 22.

RAY.

Wall Street, March 5.

PERSONAL.

Mr. Arthur D. Newton, of the Eddy Electric Manufacturing Company, of Windsor, Ct., has been in New York several days.

Mr. J. Elliott Smith, for many years superintendent of the Fire Alarm Telegraph of New York, has been retired and the office abolished.

Col. J. W. Godfrey, the energetic sales manager of Habirshaw products, was in Chicago last week, and the prevailing opinion seemed to be that he is the same "Jim" as during the World's Fair time.

Mr. H. F. Blackwell, Jr., of Brooklyn, has been appointed assistant to Fire Chief Bonner of New York, and will have entire charge of the Fire Telegraph system of Greater New York. This is a very excellent appointment.

Mr. Stephen V. Morrin, general manager of the Clonbrock Boiler Company, has been seriously ill with pneumonia, but his many friends in engineering and electrical circles will be glad to hear that he is now rapidly recovering.

Mr. Charles E. Brown, secretary of the Central Electric Company, Chicago, is a New York visitor, accompanied by Mrs. Brown. They are guests of the Waldorf-Astoria. Mr. Brown is a successful and popular member of the electrical fraternity.

Mr. C. N. Fay, well known in telephone and electric lighting circles, of Chicago, is president of the Remington-Sholes Company, of Chicago, manufacturers of the Rem-Sho typewriter, a new and rapidly-becoming popular machine. Mr. Fay is now in Europe, but expects to return soon to actively enter the work of advancing the interests of his company.

Messrs. E. Ward Wilkins, of Partrick, Carter & Wilkins, accompanied by Mr. H. C. Adams, Jr., secretary of the Phillips Insulated Wire Company, paid a very pleasant call to the ELECTRICAL REVIEW's western office last week. The gentlemen were "in charge" of the genial Willard W. Lowe, of the Electric Appliance Company, who took particular pains to pilot the visitors safely through the mazes of Greater Chicago.

Mr. Fred A. Gilbert, president of the Boston Electric Light Company, Mr. S. M. Hamill, general manager of the Brush Electric Company, and several city officials of Boston, passed through New York last week on the lightning express. They were inspecting the lighting plants in the cities of Buffalo, Cleveland, Philadelphia, Brooklyn, Newark and Trenton. The Boston system, which under President Gilbert's intelligent and experienced management is one of the best electric illuminating organizations in the world, is to be greatly enlarged, and this trip was, no doubt, made with the intention of seeing the latest practice in other cities.

LATE ELECTRICAL NEWS.

The Pan-American Exposition, Buffalo, has been postponed, owing to the unsettled condition of the Spanish-Cuban question.

Mr. C. C. Warren, president of the Warren Electric Manufacturing Company, of Sandusky, Ohio, has applied to the courts asking that a receiver be appointed for the company.

A London dispatch says an English electrical engineer sold the Spanish government the mine that destroyed the United States cruiser "Maine." He is coming over to tell about it. His name is not given.

The steel wire and nail manufacturers of this country have practically consolidated. The American Steel and Wire Company is the name of the organization, and $50,000,000 is its capital. Geo. T. Oliver, of Pittsburgh, is to be the president. Roeblings and Washburn & Moen are the houses having large electrical interests which are said to be included in the consolidation.

A long-distance telephone message probably saved the life of Charles D. Wingate last Saturday. His father, Gen. Geo. W. Wingate, of Brooklyn, learned that his son was in Washington, D. C., in a very despondent mood and telephoned to a Washington friend to see him at once. The friend arrived at the young man's room a few moments after the would-be suicide had taken paris green. Prompt remedies saved his life.

The Brush Arc System in Brooklyn and Buffalo.

The Brush Electric Company, the pioneer arc light company of this country, has kept in step with electrical progress from the day it first entered this field of industry and established its practical central station system in all the leading cities. As the demand for larger dynamos became noticeable, the developed apparatus of the Brush company, it was found, filled the requirements in all instances, and to-day nearly every successful lighting station is equipped in some degree with this company's product.

Two recent orders placed with this company's Schenectady works are from the cities of Brooklyn and Buffalo. The new Kings County Electric Light and Power Company's station in Brooklyn will probably be the model of its kind when completed, as it will be, early in July next. Every possible example of modern practice in electric lighting is assured for this new plant, built under the practiced eye of Mr. A. M. Young, the president of the New England Engineering Company, of Waterbury, Ct. When the electrical system was ordered, among the first things decided upon was that the Brush multipolar arc dynamos must be installed. Five 150-lighters, each lamp of 2,000 candle-power, have been ordered and are to be installed in time for the first turning on of current at this modern station.

Another order for Brush apparatus, that naturally pleases the persuasive general manager of the Brush Electric Company, Mr. S. M. Hamill, is from the Buffalo General Electric Company. This is one of the best managed lighting companies in the United States, and praise to its general manager, Mr. Chas. R. Huntley, is properly due for this highly satisfactory situation. The Brush order amounted to 12 dynamos, of 125 arc lights each. The Buffalo company had before purchased five of the 125-lighters, together with 300 arc lamps. These lamps are used in lighting Delaware avenue, celebrated for its resplendent light. Every one of the arc lamps in the brilliant avenue are the new Brush, of 2,000 candle-power, two lamps on each pole. The poles are 100 feet apart, and on both sides of the street. A good authority states to the ELECTRICAL REVIEW that there is nothing in the world to equal this avenue in point of street illumination, and to the Brush arcs must the honor be awarded.

TOLD IN THE DYNAMO-ROOM.

"Say, boys, what do you think," shouted Bert, as he rushed into the station a few days after Jim's discovery of the insulated carbon, waving an envelope in one hand, while with the other he almost flung his lunch bucket on top of a pile of carbon boxes; "here's a letter the boss handed me as I passed the office; it's addressed to Mr. Bert Edison Ford, Electrical Inventor (do you get on to the electrical inventor?), care of the Centerville Electric Light and Power Company, and where do you think it's from?"

"Oh, I suppose it's from Tesla asking you to help him out on some problem pertaining to his vacuum-tube lighting," gravely suggested Benson, who was taking the cylinder head off one of the engines with a view to discovering the cause of a slight knocking he had heard the night before.

"Or perhaps from Professor Andrée wanting you to design a motor for his air-ship," ventured Jim, who had caught Benson's wink.

"Now you fellows can try and string me all you want to, but, just the same, this child is going to become as famous as the foremost inventor of the age if this thing keeps up," Bert replied, somewhat indignantly, "and you needn't know who the letter is from, either, as long as you are so smart."

"Ah, here, Edison, don't get huffy now; let's hear what it says," spoke Benson and Jim in chorus.

"Well, I'll read it to you, but I can't for the life of me tell how these things leak out, unless that fellow, Reed, who was here the other day, gave it away to some newspaper man; you know he knows all of them. But here is the letter:

DYNAMO-ROOM, ARMSTRONG ELECTRIC CO., ARMSTRONG, PA., February 15, 1898.

MR. BERT E. FORD,

DEAR SIR: I have read an account in the ELECTRICAL REVIEW of the several experiences you had with lamps and dynamos in your station, and consider them very interesting and instructive. I always can make better light in cold weather and with less power than in warm weather. I will tell you of a little experience I had with a lamp the other day. It is an enclosed arc lamp, and when thrown in circuit takes a large amount of current, as high as 85 amperes, runs voltage up on one side and breaks the lamp in circuit. A friend of mine is trying to fix it, but when he throws it in, it throws off the belt, blows my fuses and makes things lively for a time. Perhaps you can suggest where to look for the trouble. I am running a three-wire Edison system, using two Eddy dynamos, compound wound, 125 volts and 120 amperes.

Yours respectfully,

HENRY G. HARPER, Dynamo-tender.

"There!" exclaimed Bert, looking up rather proudly. "They're beginning to consult me already."

"You are certainly becoming quite famous," remarked Benson. "Being asked for advice by your fellow workmen is surely something to be proud of; but how are you going to help your admiring friend out?"

"Well, let me see," reflectively replied Bert, running his hand repeatedly through his hair, a habit which always indicated deep thought on his part and often made his hair literally stand on end. "If that fellow's lamp takes 85 amperes there's a 'short' some place in the lamp, that's all there is about it, see?"

"Yes, I see," said the lineman, as he helped the engineer replace the piston, whose rings had been found to be a mite loose; "but it seems to me that your friend Harper has discovered that fact by this time."

"Well, Great Scott! do you think I'm a mind reader? Let him send his dinged old lamp here and I'll find the trouble; but I'm no telepathist, whatever that means," with which Bert began taking the covers off the dynamos and prepared things in general to start for the night's run.

"By the way, Bert, did you notice that there were quite a number of little sparks playing around that exciter armature last night?" asked Benson. "I spoke to Jim about it, and he claims you caused the trouble last week when you were trying to electrify old Dettmer's wife."

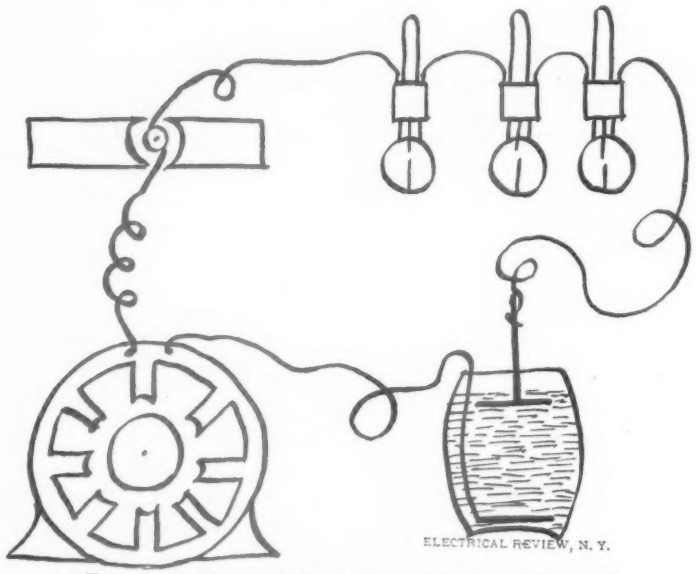
"Oh, Jim is always claiming something," responded Bert. "Nothing happened that time except throwing the belt, as you know. However, I'll examine it carefully before we start, for it would leave us in a nice fix to have anything happen to it with the extra armature down in Chicago being rewound."

Bert accordingly gave the exciter a critical examination, but could find nothing wrong, and shortly after, everything being in proper shape, the machines were started as usual.

All the machinery had been running nicely for about an hour, and the conversation between the three had begun to lag somewhat, when Bert reminded Jim of the story he was going to tell the other day about that plant in Emporia.

"Oh, you mean about that manager of the Imperial plant I was putting up?" asked Jim.

"Yes, I think it was; but just wait a second until I tighten that belt a little," said Bert, running to the alternator, whose belt was beginning to flap and wabble. "Now go on with your fairy tale."



"TOLD IN THE DYNAMO ROOM."—BERT'S SYSTEM OF EXCITATION.

"It's no fairy tale, because it really happened," resumed Jim, attempting to manufacture a cigarette out of a strip of tissue paper and some straight-cut tobacco, his metropolis dulcinea having expressed a decided dislike to pipes or cigars. "I was ready to run the arc circuits, and before I began I asked the manager for an order for some solder to solder the joints. 'What do you need the solder for?' he asked. So I explained to him that each joint should be well soldered, so as to keep the resistance as low as possible. Do you know, that fellow looked at me for a while, and then said:

"'Well, that's all right, but aren't you afraid that the current will melt the solder and some of it will drop on people's heads?'"

"Great Scott! You don't mean that an intelligent man asked such a fool question?" exclaimed Bert.

"Not only that, but he was one of the committee of three sent out to select the particular lighting system to be adopted, and objected to the T.-H., because at one of the large stations they visited he thought it took altogether too many boilers to supply the lights, the Imperial station, which they had inspected earlier in the evening, having only one boiler and engine."

"Oh, there are probably just as big fools in the business to-day," spoke up Benson. "I heard a good one on the new superintendent at the motor factory——" but here he was interrupted by a series of sounds resembling the noise of an exploding bunch of firecrackers, accompanied by a half-scraping, half-buzzing noise, and before either of the three had time to more than turn around, the incandescent lights went out and the exciter belt was driving nothing but the iron core of the armature. Fortunately the pilot lamp of the commercial arc circuit gave sufficient illumination, and while Benson was shutting down the engine, he said:

"Well, boys, this settles the incandescents for to-night, I suppose, unless Edison can quickly devise a scheme to excite the alternator."

"Yes, I think I can give you light in about 15 minutes," replied Bert, who had been doing some strong thinking all this time; "and as soon as the boss comes, who is, no doubt, on his way, I'll submit my plan to him, but meantime, you fellows just get a move on you and help me get things ready."

"But what in thunder are you going to do?" asked Jim, staring helplessly at the mass of wire, commutator segments and binding wire with which the floor near the exciter was covered.

"Why, you thick-headed idiot, use that idle arc machine as an exciter," replied Bert, somewhat savagely.

"Now, Edison, don't be foolish; you know that won't work," remarked Benson. "Of course not," added Jim; "first thing you know you'll burn that out too."

Just then the door opened and in walked, or rather ran, Mr. Evans, whose eyes took in the situation at a glance. "Well, boys, this is too bad," he said; "why couldn't that armature hold out another month; our new machines would be running by that time. I suppose we might as well give up the idea of starting up again to-night."

"If you please, Mr. Evans," interrupted Bert, "I believe we can start all right;" and he hurriedly explained to the superintendent what he proposed doing.

"By Jove! Bert, if that works I'll raise your pay $10 a month. Here, Jim, you run and get one of the empty oil barrels in the boiler-room, and you, Benson, run a circuit of No. 8 or 10 wire from that arc machine to the alternator, putting in two, or better say three, lamps in series."

These instructions were quickly being carried out, Evans and Bert, in the meantime, securing two iron covers off some old-style circular converters and attaching a piece of rubber-covered wire to one and a piece of one-half-inch gas-pipe to the other. Jim was told to fill the barrel nearly full of water, and was then dispatched to old Dettmer's house, with instructions to secure all the salt available. He soon returned with some eight or ten pounds of the chloride, which Evans told him to dissolve in the water. This done, one of the iron covers was allowed to rest at the bottom of the barrel, the other plate being suspended at the surface of the water by means of a piece of scantling across the barrel, the gas-pipe rod passing through a hole in the scantling, and being held in place by a wedge. This being arranged, the circuit was connected as shown in sketch, and Benson, meanwhile, having brought the arc machine to about half speed, Mr. Evans told Bert to "throw her in." Bert obeyed, with an assuring smile, which broadened into the widest kind of a grin as the incandescents showed a reddish glow.

"A little more steam, Benson," commanded Evans. The engineer opened the throttle wide and the lights jumped up to a dangerously high voltage.

"Those three arc lamps, turn them on quick!" shouted Evans to Bert, who, however, had anticipated the superintendent's order, with the result that the lamps now lacked but a few volts of normal. Evans now gradually lowered the upper plate in the water rheostat until the desired candle-power was reached, leaving Jim in charge to watch for any fluctuations in the load. The whole proceedings had not occupied more than half an hour, and the service was not interrupted again that night.

Bert now draws a larger salary than before, but he afterwards explained that the idea was not original with him, but was first used by a friend of his named Jim Smith, who was running a plant down in some Texas town. Nevertheless, Bert rose considerably in the estimation of all around the Centerville plant.

Improved Sand-Box.

The Ham sand-box illustrated herewith and controlled by the Electric Appliance Company, of Chicago, is based upon the theory that any box provided with a valve at its bottom is impracticable; and if the valve be made tight enough to prevent the sand from sifting through, it will require great force to operate it; while if the valve be loose enough to work easily, it will allow the sand to sift around it. The company also claims that if a pebble get into the valve slide it will hold it open so that the sand will run out of the box.

HAM SAND-BOX COMPLETE AND IN SECTION.

In the No. 3 Ham sand-box illustrated, all parts are made of bronze metal. It has an opening in the box, under which is a curved shelf. The ends of the shelf extend beyond and above the opening in the box, so the sand can not escape by gravity. A paddle is reciprocated above the shelf, and the movement of the paddle forces the sand in each direction, alternately, over the ends of the shelf to the feed spout, which leads to the car track. Above the paddle are two fingers which stir the sand. The connecting rod passes forward to the car platform, and is operated by a pin and bell crank lever, or by a hand lever. The working parts are extremely simple and the motions direct. The strokes of the foot or hand may follow each other so rapidly as to practically secure a continuous, but small, stream of sand, a decided advantage in hill climbing. It can be easily seen that waste is impossible in this box, as the sand flows only when the lever is in motion, and the quantity of sand is regulated.

The sand hopper, inside of the car and directly over the sand-box, may be made of any form desired. If the space under the seats is enclosed, a square soap-box, or any other cheap form of construction, may be employed.

Small stones or other small substances will not interfere with the operation of this box, but will pass freely through it. In fact, the company recommends coarse in preference to fine sand, even if it contains gravel stones as large as peas, as it is less likely to pack in the box.

The manufacturers state that they have unsolicited testimonials favorable to the box received from prominent railroad men.

New Electrical Marine Equipment.

The illustration herewith shows a new type high-power lens-mirror projector, lately brought out by the Rushmore Dynamo Works, of Jersey City, which, as is well known, make a specialty of marine equipment.

This little light is intended for the smaller class of yachts of 100 feet or over, and it is not too large for the tiniest boat that can float a dynamo to supply the current. The lens is nine inches in diameter, the total height but 15 inches, and weight complete, 40 pounds. It throws a clear, round, solid beam, and with eight amperes will show up a buoy at one-half mile on the darkest night. The first projector of this type was installed on the racing yacht "Presto," built by Mr. Chas. D. Mosher for Mr. Wm. Mollenhauer. The beam is controlled by two distant controllers, one in the pilot-house and the other aft on the bridge.

The Rushmore works are building projectors in all sizes up to 72 inches diameter for naval and commercial service. They have cut free from the foreign lens-makers, and now have one of the finest lens-making plants in the world. They not only grind and polish the lenses, but prepare the special glass required, and have lately installed a large "sweating" furnace, heated with crude oil vaporized by heated compressed air. Selected pieces of the special glass are placed in fire-clay moulds of the shape of the rough lens, and the heat is gradually increased until the glass "sweats" down between the halves of the mould and the surplus oozes out from the sides. As soon as the "sweating" is complete the mould is placed in an oven and buried in red-hot sand, where the temperature is gradually reduced for a period of two weeks.

The glass, when cold, is thoroughly annealed, and will stand the severe heating and chilling to which it is exposed in the searchlights without risk of breakage. The grinding is done in immense machines which sweep out the true parabolic curve with an accuracy that has heretofore been considered impossible, and were it not for the fact that the crater of the positive carbon from which all the projected light comes is of considerable size, instead of being an infinite point, as is the focal point of the lens, the beam would not spread at all, but would appear to an observer near the light to run to a point and disappear. The inevitable spreading due to the crater is in practice just the amount required to equal the perspective, and thus to the operator the beam appears perfectly parallel.

The Rushmore works have in the last week sold over 50 projectors for all classes of service. Seven 14-inch projectors are being shipped to San Francisco and four to Portland, Ore., for steamers fitting out for Alaska. They also sold a complete plant, consisting of one six-kilowatt and one 30-kilowatt direct-connected generating set, switchboard and a 45-ampere projector for the Alaska steamer "Cartina," fitting out at Elizabethport for the Boston–Seattle Company, and on the same day they closed a contract through their Baltimore agents, D. E. Evans & Company, for a 12-kilowatt generating set and 25-ampere projector for the steamer "Susquehanna."

RUSHMORE HIGH-POWER LENS-MIRROR PROJECTOR.

The motors for the equipments of the Brooklyn Elevated Railway will be the Walker 15 L. 80-horse-power type. The Brooklyn road is the first elevated railway in the East to adopt electric traction, although it is probably a matter of but a few months before all the elevated railways in Greater New York will change.

TELEPHONE NEWS AND COMMENT.

The Colorado Telephone Company is about to erect a $10,000 building at Pueblo, and will complete its line from Pueblo to La Junta this year.

Mr. E. W. Swarthout, of Aurora, Ind., informs us that a company is being formed there to put in an exchange of from 50 to 100 numbers, and desire prices from telephone manufacturers, and also price on good second-hand switchboard.

The Beaumont Telephone Exchange informs the ELECTRICAL REVIEW that the ordinance recently passed granting to the Southwestern Telephone and Telegraph Company a franchise for an exchange at Beaumont, Tex., was repealed on February 1.

In Germany a telephone apparatus, under the control of the Post Office, will be rented at about $12 a year, with an additional charge of one pfennig (the hundredth part of 25 cents) for every private conversation, two pfennigs for every business conversation and three pfennigs for hotel conversations.

Scott L. Smith has begun suit in the United States Court at Indianapolis against the Western Union Telegraph Company for $5,000. Mr. Smith complains that William Whittington sent a message to him at Shawneetown, Ark., paying $3 to guarantee its arrival the same day. It was not delivered for two days, and when Smith arrived in Jeffersonville, in answer to the telegram, to attend the funeral of his mother-in-law, Mrs. Whittington, she had been buried.

Attempts are making to obtain ordinances for new telephone companies in Chicago. One was introduced at the council meeting, giving the Independent Telephone Company, of Chicago, a franchise to maintain wires and an exchange in Chicago. The company is required to pay three per cent of its gross receipts as compensation to the city semi-annually, and is expressly prohibited from selling, leasing or transferring its franchises. The company is prohibited from charging more than $75 per annum for each telephone for the first year and $70 for each year thereafter. In cases where contracts are made for three years or more, the maximum charge is $65. The company is required to furnish all the departments in the City Hall telephone service free of charge, and to furnish the city fire and police telephones at $1 each. By the provisions of the ordinance the company must have 5,000 instruments in operation on and after January 1, 1902.

No information as to who is behind the company could be ascertained, but it is said to be projected by Chicago capitalists.

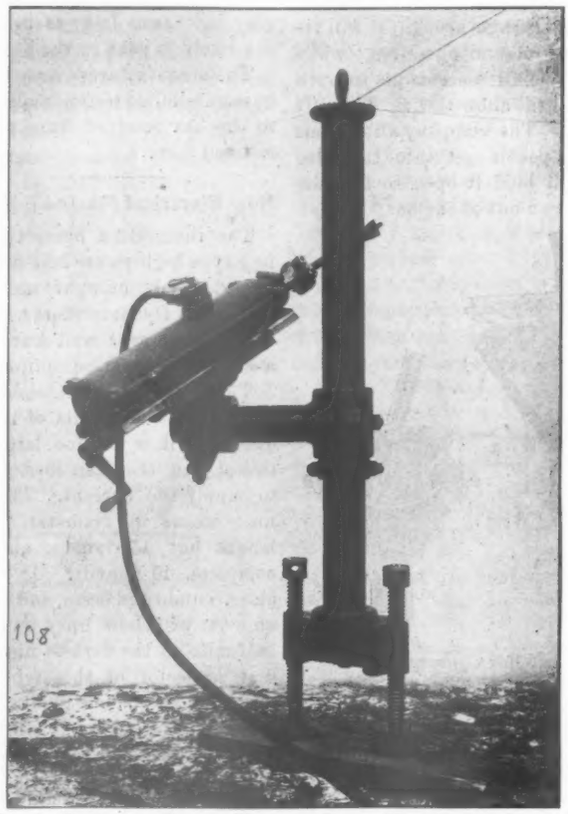


FIG. 1.—IMPROVED MARVIN ELECTRIC DRILL MOUNTED ON COLUMN.

The Universal Electrical Directory —1898.

This directory, just issued, contains the names of the members of the electrical and kindred industries throughout the world. The amount of work entailed in its compilation has considerably increased, and it has been most thoroughly revised.

The British alphabetical section now comprises about 9,918 distinct names.
The Continental alphabetical section now comprises about 7,872 distinct names.
The American alphabetical section now comprises about 4,080 distinct names.
The Colonial alphabetical section now comprises about 1,924 distinct names; a total of 23,794, approximately 1,136 names of individuals and firms more than were contained in the book for 1897.

For simplicity and facility of reference it is divided into four groups; namely, British, Continental, American and Colonial, which are again sub-divided into alphabetical and classified sections; in the case of the British a geographical section is given, making in all nine sub-divisions.

In addition to the new names incorporated in the present issue, much financial information is given, the telegraphic addresses and local telephone numbers are given, and the total of pages added to the work is 70 as compared with that of 1897, making in all about 1,100 pages entirely of directory matter.

It is, therefore, the largest, as it is the oldest, electrical directory in the world.

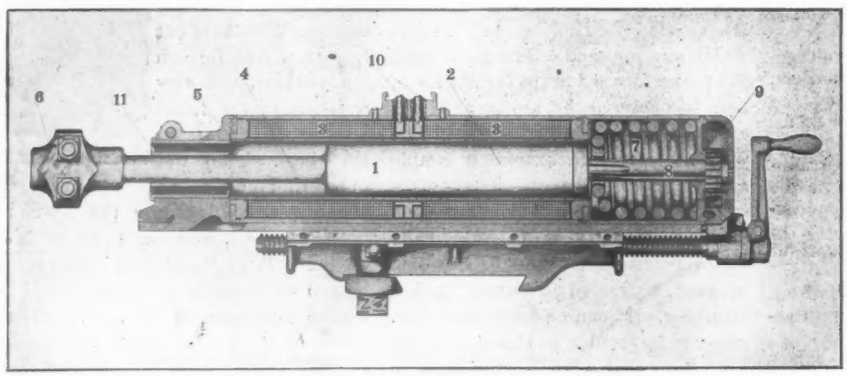


FIG. 2.—SECTION OF IMPROVED MARVIN DRILL.

THE MARVIN ELECTRIC PERCUSSION DRILL.

BY F. H. LORING.

Those who are interested in the application of electricity to mining will find the following description of the Marvin electric drill apparatus of interest.

Fig. 1 shows the Marvin drill mounted on a column for tunnel work; Fig. 2 represents the section of a drill, and Fig. 3 gives a view of the drill pulled apart. Referring to Fig. 2, it will be observed that the body of the drill consists of two coils of wire (3–3), which form a double solenoid. A soft steel plunger (1), consisting of a single piece forging, with a chuck formed on one end to receive the bit, is located within the coils. The current is directed first into one coil, then into the other, thus imparting a reciprocating motion to the plunger. Into the back end of the plunger is screwed a rifled nut, through which a rifled bar (8) passes. A ratchet-wheel on the bar permits it to turn only in one direction; thus the plunger is slowly rotated. The buffing spring (7) checks the backward stroke of the plunger, returning the energy momentarily stored in the spring to the forward stroke.

The construction of the coils is of particular interest, being peculiar to this machine. These coils are wound with square copper wire and insulated with mica placed between turns and layers. Both coils are thus wound upon a steel spool and then slipped into a boiler tube, and the jacket thus formed is hermetically sealed at the junction of the tube and heads. The square wire, together with mica insulation, being tightly pressed into place as it is wound, renders the coils mechanically indestructible. They are also absolutely fireproof. Connection with the winding of these coils is made with three contact plugs (10), which press into three metal rings located between the windings. External connection is made with these coils by means of a connection fitted to the end of a flexible cable.

One of the most noteworthy features of the drill is the entire absence of anything in the nature of a switch or valve, this being unnecessary, as the current is alternately directed into the two coils by the generator

itself. The generator is a two-pole machine, with a drum armature containing a loop winding, imbedded in slots, which are disposed over a portion of the periphery, filling opposite arcs. In this a single phase alternating current is generated. One end of the loop winding terminates in a

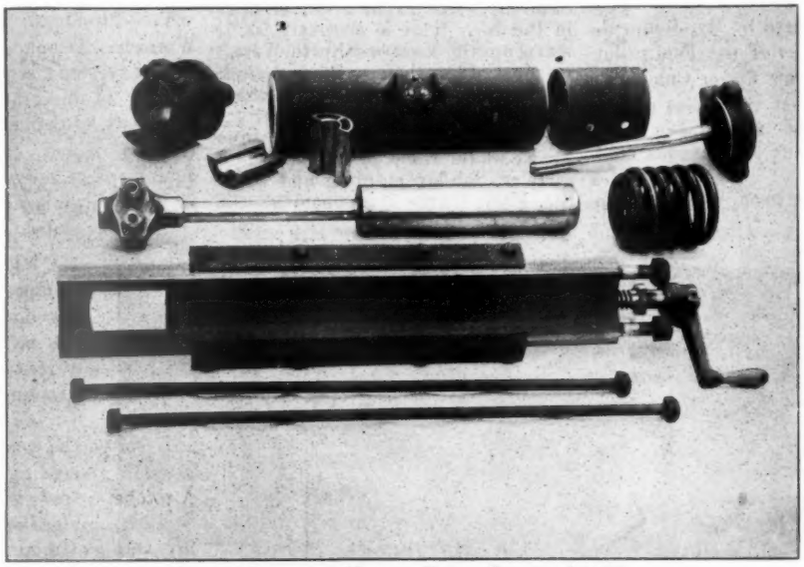


FIG. 3.—IMPROVED MARVIN DRILL PULLED APART.

solid collector ring; the other terminates in a half ring, which alternately shifts the current into the two sides of the drill circuit by means of brushes resting upon the commutator at diametrically opposite points. No appreciable sparking results, as the half ring leaves each brush at the instant when the current wave is zero. Three wires are required to transmit the current to the drills. Fig. 4 shows the arrangement of the circuits and the path of the current. By tracing the development of current in the armature and its course through the circuits, it will be noticed that one outside wire receives positive pulsations, and the other outside wire receives negative pulsations, and the flow of current in the double solenoid is such as to always magnetize the plunger one way. In other words, the magnetism in the plunger is never reversed. Likewise the field is overcompounded by the current that passes through the drills, the object being to maintain a uniform pressure of 135 volts at the drills, whether one or more are at work. The middle wire is the common return for both phases of the current. Fig. 5 represents a Marvin drill generator. It will be observed that four coils are shown. Coils B and B receive current from a small exciter, as the generator is not self-exciting. Coils A and A are the compound coils. The speed of the generator is usually 380 revolutions per minute, and every revolution of the armature produces one complete stroke of the drill.

The design of the generator admits of subdivision for mule-back transportation. The field is built up of sheet-iron punchings, bolted together at the four corners. Into side channels are laid the field coils, which completely surround the armature. The construction of the machine throughout is such as to admit of subdivision into packages not exceeding 300 pounds each.

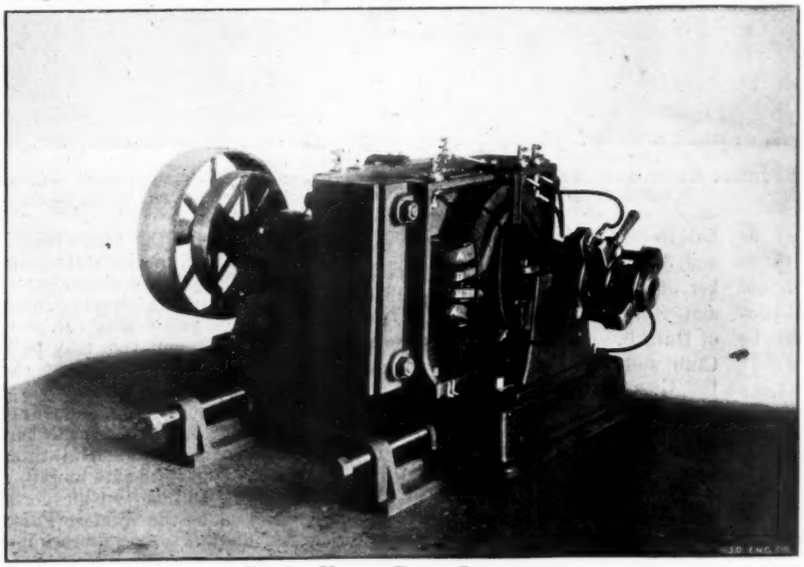


FIG. 5.—MARVIN DRILL GENERATOR.

A Busy Manufacturing Company.

The Walker Company, Cleveland, will shortly install two six-pole, 100-kilowatt lighting generators in the Metropolitan Museum of Art in New York. The Presbyterian Hospital has also placed an order with the company for a 100-kilowatt generator and switchboard. A Walker alternator, three-phase, 60-cycle, for lighting and power, has been purchased by C. Burkhart, of Hudson, Wis., while the Los Angeles Traction Company, of Los Angeles, Cal., has ordered a 500-kilowatt railway generator of the belted type and a generator panel for the switchboard. Among the electric railway equipments recently ordered may be mentioned 10 double 3 S equipments, with type S controllers, sold to the Erie Construction Company for the Buffalo Traction Company; three double 40-horse-power equipments, with S controllers, to Isaac A. Walker & Son for the Quakertown, Pa., Traction Company, and two double 3 S equipments for storage battery motor cars to S. M. Fisher for the Patton Motor Company.

The Receivership of the Connecticut Pipe Manufacturing Company.

TO THE EDITOR OF ELECTRICAL REVIEW:

In your issue of March 2 appears a copy of the decree in favor of the National Conduit Company against the Connecticut Pipe Manufacturing Company. As some misstatements have been made in regard to the facts of the decree, I should be obliged if you would give publication to the following letter of Mr. James Harold Warner, attorney for the Conduit Company:

New York, February 26, 1898.
Conduit vs. Ct. Pipe.

MY DEAR MR. BEACH: Replying to your favor of February 24, I have no hesitancy in writing you that in my opinion the decree entered in the above

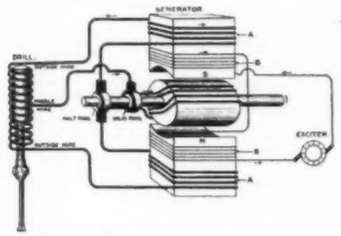


FIG. 4.—ARRANGEMENT OF CURRENT IN MARVIN DRILL.

entitled case does not extend to the receiver of the Connecticut Pipe Company. That decree, as I interpret it, extends only to the defendant company, its officers, agents and employés, and the receiver, being an officer of the court, and representing primarily the creditors, is therefore not comprehended. Faithfully yours,

JAMES HAROLD WARNER.

John Kimberly Beach, Esq.,
9 Law Chambers,
New Haven, Ct.

You will perceive by the above that the decree affects only the company and does not affect the rights of the receiver nor of any person to whom he may transfer the property and rights formerly belonging to the Connecticut Pipe Manufacturing Company. I wish you would give as much prominence to this communication as you have already done to the judgment itself. I have in my hands for sale the plant, good will and property of the said company. I wish to prevent any misunderstanding which might affect the sale of the property or the transaction of business connected with the sale of pipe by me as receiver, or the persons to whom I may transfer the property.

Yours very respectfully,

TALCOTT H. RUSSELL,
Receiver of the Connecticut Pipe Manufacturing Company.

New Haven, Ct., March 4.

PLAN FOR SUMMER MEETING OF THE NORTHWESTERN ELECTRICAL ASSOCIATION CONVENTION.

Through Mr. J. M. Hill, of Chicago, the Northwestern Electrical Association is arranging a trip by steamer from Chicago to Duluth and Superior, returning by rail. The time consumed by such a trip, including two days' convention at Superior, would be between five and six days. The possibilities for enjoyment and profit of such a trip by water on board the steamer are very attractive. Papers could be read and discussed on board.

Mr. Hill writes us as follows concerning the proposed meeting and trip:

Probably no other plan would give to us so much of what we consider the most valuable features of a convention — that is, the opportunities for associations (which would be lasting associations) and for the interchange of ideas. These features of a convention are often weakened, and at times entirely lost, at conventions held in large cities, by the scattering of members on account of other attractions entirely outside the real interests of the association. Three days on board a steamer, it seems to me, would be the most profitable three days' convention we could possibly hold. Many of us would make this trip our Summer outing, and I know that a large number of us would welcome the opportunity to take our wives and families with us. Therefore, a most enjoyable programme on board ship should be made up.

At the entrance to the great Lake Superior is the city of Sault Ste. Marie, where are located the government ship canal and the locks. It is stated on good authority that more tonnage passes through this ship canal than passes through the famous Suez Canal. There are also at this city many points of interest, and I have been assured by Mr. Wm. Chandler, president of the Edison Sault Electric Company, that a stop by us of four hours there would be made pleasant and profitable.

There is another point of great interest on the lakes, and that is the home of the Calumet & Hecla Mining Company, at Calumet, Mich. I have no doubt but that, on account of copper entering so largely into all electrical development, the officers of that company will be glad to see us, and that we shall be given full opportunity to visit the mines and various plants of the largest copper mining company in the world. I have been assured by Mr. James R. Dee, the manager of the Peninsular Electric Light and Power Company, at Houghton, that the ladies of our party would be well taken care of by the citizens of Hancock and Houghton.

The invitation to our association to hold its Summer convention at Duluth and Superior comes from the Chamber of Commerce, Common Council and Shippers and Jobbers' Union, of Duluth, and from the Commercial Club and the Common Council of the City of Superior, and I am informed that these same public bodies would, in the event of our accepting these invitations, invite six prominent men in the history of electrical development, to be the guests of the cities during the convention. Among these would be Mr. Edison, Mr. Tesla and the president of the National Electric Light Association. In such an event this association should invite these same gentlemen to be the guests of the association on their trip from Chicago to Duluth and return.

The executive committee of the National Electric Light Association has named Chicago as its next convention point, and set June 7, 8 and 9 as the date for such meeting. There are many of us who will be pleased to be present at the meeting of the National Association in Chicago, and it is desirable that all of us who can do so should attend that meeting, providing a date is named that would make it possible for us to do so without sacrificing our own convention. This would be possible. It is planned to leave Chicago on Saturday, June 11, at noon, or later in the day. This is necessary, as, if we secure the steamer "North West," we must do so before she goes into her regular service, she being scheduled to leave Duluth June 14.

Providing we leave Chicago on June 11, we would reach Mackinac Island early on Sunday morning and Sault Ste. Marie shortly after noon.

The expense of the entire trip, including steamer, meals, state-rooms, hotels at Duluth and Superior, rail returning, including sleeping-car accommodations and dining-car, would not exceed $43, and this may be reduced quite a little. The estimate is based on direct proposals made by the steamship companies, and reduced rates of $2, $2.50 and $3 per day being promised by the hotels at Duluth and Superior. One-third rate by rail, returning from Duluth to Chicago, has been secured by the Western Passenger Association. No entertainment expense on such a trip is necessary.

Let us then accept these invitations so kindly given. Let us make this trip by water, of which it is said, "In all the world there is no trip like this." A three days' convention on the water, which would mean constant associations, both day and evening. Let us take advantage of the opportunity for such an electrical demonstration and let us herald to the world this great northwestern country, with its progressive and energetic cities on the great Lake Superior.

A view of the great steamer on which it is proposed to make the trip is presented on this page. The address of Mr. Hill is Monadnock Building, Chicago.

THE SUMMER MEETING OF THE NORTHWESTERN ELECTRICAL ASSOCIATION.—PARLOR ON NORTHERN STEAMSHIP COMPANY'S FINE SHIP "NORTH LAND," WHERE MEETINGS ARE TO BE HELD.

WESTERN TRADE NOTES.

Vice-President Bisland, of the Western Telephone Construction Company, reports additional orders coming in in gratifying numbers. Mr. Platt, of the company's staff, has recently closed contracts for the equipment of several new exchanges in West Virginia and other southern states.

Chicago Armature Company has been working double time during the last few months in order to keep up its reputation for quick repairs. In the commutator line the company is also exceedingly busy, and its trade is fast extending to all the states of the Union. Among the recent orders President Swingley mentioned some as coming from the states of Washington in the West, New York in the East and Mississippi in the South, showing the large extent of the company's business.

Mr. J. A. Erner, of Erner & Company, Columbus, Ohio, spent last week in Chicago arranging the details of a new business arrangement under which his firm will not only do a general contracting and engineering business, but will also carry a complete stock of electrical supplies in that important city. Mr. Erner was formerly a member of the firm of Bissell, Dodge & Erner, Toledo, and his long experience in the business and wide acquaintance among the trade warrant us in predicting a successful future for the new firm.

McGill & Pomeroy, manufacturers' agents, Chicago, after this month will be located at 321 Dearborn street, where offices and storeroom have been secured. The removal of several electrical firms from so-called office buildings to locations where store and display rooms can be had seems to indicate that a "store front" on any prominent thoroughfare is more suitable for the transaction of business than even the elaborate offices in the rather congested sky-scrapers. C. E. K.

Chicago, March 5.

ADVANCE INFORMATION

Increase of Capital.

CATSKILL, N. Y.—The stock of the Catskill Mountain Telephone Company has been increased to $5,000.

ST. LOUIS, MO.—The Citizens Electric Lighting and Power Company has increased its capital stock from $750,000 to $2,000,000, and directors from five to seven.

CINCINNATI, OHIO—The Jones Brothers Electric Company will increase its capital stock from $200,000 to $220,000.

FLUSHING, N. Y.—The Flushing Electric Light and Power Company has increased its capital stock from $100,000 to $250,000.

New Incorporations.

SAN FRANCISCO, CAL.—Electric Mortar Hardener Company has been incorporated by James McKendrick, Abraham Blumenthal, William Loewi, J. C. Meyerstein and L. F. Humphrey; capital stock, $1,000,000.

MANHATTAN, N. Y.—Wappler Electric Controller Company has been incorporated; capital, $5,000; directors, R. H. Wappler, J. C. Jacoby, F. H. Wappler and Charles Fayer, of New York city.

SANDY HILL, N. Y.—The Warren-Medbery Company has been incorporated, with a capital stock of $25,000; directors for the first year are H. J. Medbery and S. C. Medbery, of Ballston Spa; H. B. Warren, of Yonkers, and W. H. Cunningham, H. E. Tidmarsh, Lincoln Paris and George W. Wait, of Sandy Hill.

PORTLAND, ME.—The Union Telephone Company has been incorporated, with Frederick H. Gorman, president; George A. Beaton, treasurer; for the purpose of acquiring and operating telephone lines and dealing in telephone and electrical supplies; capital stock, $10,000.

ST. PAUL, MINN.—The Mankato Citizens' Telephone Company has been incorporated by Lorin Cray, H. E. Hance, W. A. Funk, J. H. Funk, J. H. James, Ed. I. P. Staede, and others; capital stock, $25,000.

DUNKIRK, N. Y.—Dunkirk and Fredonia Telephone Company has been incorporated; capital, $40,000; directors, Robert J. Moorehead, of northeast Pennsylvania; J. C. Moorehead, of Cleveland; S. Fred. Nixon, of Westfield, N. Y.; M. A. Phelps, F. W. Plato and G. H. Frost, of Buffalo, and S. B. Rawson, of Elyria, Ohio.

SAN FRANCISCO, CAL.—The California Automatic Telephone Company has been incorporated. Principal place of business, San Francisco. Directors, George H. Powers, Wm. F. Russell, Wm. F. Smith, James G. Spaulding, of San Francisco, and James M. Allen, of San Mateo.

Electric Light and Power.

WEST POINT, MISS.—C. L. Jordan, Mayor, may give information concerning proposed electric light plant.

NATCHEZ, MISS.—The Natchez Gas Light Company will expend about $10,000 in improving and adding new machinery to its electric light plant.

ATHENS, TENN.—City Clerk may give information concerning electric light plant, which will be established.

MEYERSDALE, PA.—Meyersdale Electric Light, Heat and Power Company has been incorporated, with a capital stock of $10,000.

SHEFFIELD, ALA.—The Kitson Hydrocarbon Heating and Incandescent System Company has been incorporated by W. R. Brown, A. B. Cook, Jr., B. B. Cohen and J. H. Nathan, to erect an electric light and heating plant; capital stock, $5,000.

EUREKA SPRINGS, ARK.—The Citizens' Electric Company has been incorporated by W. M. Duncan, president; A. R. Sayle and L. P. Badgen, to operate plants for electric light, etc.; capital stock, $25,000.

SIOUX FALLS, S. D.—The Interstate Telephone Company, at this place, has been incorporated with a capital of $10,000,000. Incorporators, C. O. Bailey, J. H. Voorhees and J. W. Carter.

HAWESVILLE, KY.—A franchise has been granted to C. H. Walls & Co., with all the rights and privileges, to erect and operate an electric light plant.

PERKASIE, PA.—A local company is forming to erect an electric light plant at this place. An ordinance has passed Council granting the franchise. It is proposed to light the surrounding villages as well as the town of Perkasie.

LA CROSSE, WIS.—A movement is on foot in the village of Bangor to organize a local stock company to establish an electric light plant. Consummation of the project is assured.

ALBANY, N. Y.—The Queen's Borough Electric Light and Power Company has been incorporated, with a capital of $250,000. The chief office of the company will be at Far Rockaway. The following are the directors: Van Wyck Rossiter, D. H. Valentine, Royal C. Peabody, C. L. Rossiter, T. S. Williams, of Brooklyn; Frank McGovern, of New York city; Joseph C. Biglin, of Far Rockaway; I. M. Sutton, of Flushing, and H. Hobart Porter, Jr., of Lawrence.

HAGERSTOWN, MD.—Powell Evans will construct a dam across the Potomac River near Hagerstown, for the development of water-power, and to erect an electric plant for transmission of power to factories, etc.

CUMBERLAND, MD.—The Ambos Construction and Electric Company, of Cleveland, has been awarded contract for the erection of the $34,000 electric light plant at Cumberland, Md.

ST. LOUIS, MO.—The Moe & De Voll Incandescent Gas Company has been incorporated by T. M. Moe, C. H. De Voll and H. E. Green; capital stock, $250,000.

YARDLEY, PA.—The Provident Electric Light Company's plant has been sold to Robert J. Peonles for $920.

RALEIGH, N. C.—The Rocky Mount Ice Company has been incorporated, with a capital stock of $18,000. The charter gives the right also to have electric light and cold storage plants.

New Electric Railways.

WILMINGTON, DEL.—The Wilmington & Chester Traction Company has been incorporated, by a company with a capital stock of $2,000,000, to build and operate electric trolley lines in Pennsylvania, Delaware or elsewhere.

PHILADELPHIA, PA.—Standard Traction Company has been incorporated by Maynard L. Young, Edwin F. Morse, William S. Doran, J. Howard Reber and William F. Sullivan; capital stock, $1,000.

PITTSBURGH, PA.—New Kensington Street Railway Company, of Westmoreland County, has been incorporated; capital, $12,000; incorporators, T. A. Mellon, Jr., W. L. Mellon, F. M. Ross, C. T. Marsh and W. S. Mitchell, of Pittsburgh.

TRENTON, N. J.—The Ewing Passenger Railway Company has been incorporated, with a capital of $12,500. The company will build a road through the township of Ewing to Prospect street, as a branch of the Trenton Passenger Railroad Company, Consolidated. The incorporators are Henry C. Moore, president of the consolidated company; Robert S. Woodruff, Judge of Mercer County; B. Frank Abbett, Peter E. Hurley, J. H. Solomon, W. S. Gulick and F. P. Nippes, of Trenton.

FRANKFORT, N. Y.—A franchise for the construction of a proposed electric road through this village has been granted to Beckwith & Quackenbush, of Herkimer. The main office of the company is to be located at Frankfort.

COLDWATER, MICH.—The Common Council has passed an ordinance granting to Messrs. Duncan & Condon, of Saginaw, a 30-year franchise to construct and operate an electric street car line in this city.

GOSHEN, IND.—A franchise has been granted to the Goshen, Elkhart & Eastern Electric Railroad.

New Telephone and Telegraph Companies.

MUSCATINE, IOWA—The Mississippi Valley Telephone Company will shortly establish a new telephone line.

FAYETTEVILLE, N. C.—G. A. Holderness and W. J. McDiarmid contemplate the establishment of a telephone system.

PORTLAND, ME.—The Union Telephone Company has been incorporated, with G. A. Beaton, treasurer, to acquire and operate telephone lines and handle apparatus; capital stock, $10,000,000.

OWENSBORO, KY.—Leading citizens of Fordsville, Ohio County, have organized a telephone company, with Isaac C. Adair, of the Fordsville Bank, as president. About 15 miles of wire will be strung, connecting with adjacent territory.

JERSEYVILLE, ILL.—The Macoupin County Telephone Company will extend its line from Carlinville to Jerseyville, thus tapping the Jersey, Greene and Calhoun County systems, and also connecting with Alton.

RUSSELLVILLE, ALA.—A movement is on foot to build a telephone line from this place to Sheffield, which will give the town communication with Tuscombia, Florence, Sheffield, Leighton, Centre Star, Hillsboro, Decatur and Huntsville. Most of the money has been subscribed and the 'phone is a certainty.

(Continued on page 160.)

A Talking Newspaper.*

A small diamond-shaped board screwed on to the wall of my room, and provided with a couple of hooks from which hang two tiny, round telephone earpieces connected by two wires. That is all. But my hotel proprietor has been singing its praises for the last 20 minutes, and as he confidentially assured me that it will not play any part in my hotel bill at the end of my stay, there is no earthly reason why I should enter any protest against his profuse encomiums. "This," said he, "is the Telephonic Messenger, or talking newspaper—the only thing of its kind in the world. It has now been established in Budapest about three years. It differs from the ordinary telephone in the fact that the latter is directly connected with the central office, whereas we are able to connect from 200 to 300 subscribers in one circuit. The city is divided into 30 circuits. All day long news is spoken into a specially constructed apparatus at the central office, varied with entertainments, the opera and linguistic lessons. It is not a telephone in the strict sense of the word, and, therefore, does not infringe the telephonic rights of the government. It combines the functions of your tape machines and electrophones, while it is ten times cheaper. That buzz you heard just now was to prevent subscribers talking to each other on their own account."

"It seems strange that such an excellent idea as this appears to be should not be introduced in other towns than Budapest," I ventured.

"The answer is very simple. Of course, the newspaper feature would be impossible in London, where time is everything, and a man could not sit the whole day with the apparatus to his ear waiting for some particular news or exchange prices. Then again, other towns are not so advantageously situated in this respect as Budapest, where the law empowers the company to introduce the apparatus into any house in the city in spite of the objections of the landlord. We have here 6,000 subscribers, and each pays only 18 florins a year. With us it is as in England with a certain soap—our families don't feel happy until they get it. It is so cheap that many of the rooms in my hotel are fitted up with it. If the visitor finds it inconvenient to go to the opera, all he has to do is to put this apparatus to his ear, and he can be entertained the whole evening. The general public, too, can have news in advance of the newspapers. Why, a few weeks ago, when the German Kaiser gave that celebrated toast of his to the Hungarian nation, thousands of families were listening to its recital half an hour later. Without this apparatus they would have had to wait until next day."

"Have you a regular daily programme?"

"Yes; it is announced in the morning, and changes every half hour or so. The greater part of the morning is taken up with prices on 'change, a summary of the news in the dailies. At noon we begin to get a report of the doings in Parliament. Telegrams of importance are communicated at once, the telephonic messenger being in direct connection with a leading Budapest newspaper. At about two o'clock the morning news is in part repeated; then come exchange prices, telegrams, law reports, a short, entertaining story, theatrical items and, sometimes, a concert, and for an hour in the evening we get a lesson in English, Italian and French. You have no idea what a benefit this is to the young generation, and how popular these lessons are among them. A complete set of graduated exercises has been published in these languages. Each telephone subscriber who cares to listen holds a copy of the book in question before him, and the teacher speaks into the double microphone transmitter at the central office."

* Budapest Correspondence of London *Pall Mall Gazette*.

ELECTRIC LIGHT FLASHES.

E. H. McKnight has purchased from the Winters National, of Middletown, Ohio, and its associates, the Edison electric plant, of that place, with all its franchises and equipment.

The British-American Light and Power Company, of Ottawa, is applying to Parliament for power to construct and operate by electricity or other power a tramway in Dawson City, Fort Selkirk and other points in Yukon and northern British Columbia. Also to operate heating and lighting systems.

At the annual meeting of the United States Head Light Company, of Utica, N. Y., the following directors were elected: J. Kirby, Jr., Dayton, Ohio; Ward W. Willits, Chicago, Ill.; P. L. Salmon, Syracuse; F. S. Upton, Rochester; A. H. Handlan, St. Louis, Mo.; J. W. Cross, Utica. Officers were elected as follows: J. Kirby, Jr., president; Ward W. Willits, vice-president; J. W. Cross, secretary and treasurer and general manager.

ADVANCE INFORMATION.

(Continued from page 159.)

LANSING, MICH.—A new telephone line may be built between this place and Kalamazoo, which would run through Charlotte and Battle Creek and give connection with 15 or 20 counties.

MARTINSVILLE, IND. — A local stock company, headed by Hon. J. V. Mitchell, has purchased the local telephone system from J. M. Cobb. J. V. Mitchell will be president and treasurer of the new company, and D. D. Mitchell, secretary.

WANATAH, IND.—There is now a move on foot to establish a telephone line connecting Valparaiso, Wanatah, Hannah, Union Mills, Laporte, Westville, Otis and Michigan City.

LUDINGTON, MICH.—Mason Telephone Pay Station Company has been incorporated, with a capital stock of $10,000.

CHAMBERSBURG, PA.—A telephone company has been organized by the citizens of Pathville, this county, who will run a line from Richmond, Franklin County, to Blair's Mills, Junita County, a distance of 22 miles.

The Clyde Line, operating steamers between New York, Charleston and Jacksonville, Fla., in connection with Clyde's St. John's River Line, announce that on February 16 they commenced running the well known steamers between Jacksonville, Palatka, Sanford, Enterprise, and intermediate points, leaving Jacksonville daily (except Saturdays). Returning, these steamers leave the various landings daily (except Sundays) for Jacksonville, where connection is made with the Clyde Line steamers for the North. Heretofore the service on the St. John's River has been triweekly. The Clyde Line does the largest passenger business of any steamer line between New York and the South, and they have recently issued some very interesting literature, which they are sending out gratis to applicants. By addressing a communication to the Clyde Line, 5 Bowling Green, New York, our readers will, in return, be awarded with some exceedingly attractive literature regarding southern resorts.

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Two M. P. Railway Generators, 175 H.-P.; speed, 550 revolutions for 550 volts; also 220 and 110-volt dynamos and motors, switches and instruments. Apply to

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1002 Chamber of Commerce Building, Chicago.

INDUSTRIAL NOTES.

"Shade Lamps" is the title of a very dainty little catalogue just issued by the Electric Appliance Company, Chicago, covering their special lines of Espersen, Klemm and Dale electric portables and shade lamps. It is a valuable catalogue for any user or dealer in these goods and will be sent on application.

The name "Splitdorf" is known to the telephone world everywhere. Telephone induction coils, bobbins and magnets are specialties of this very widely and favorably known house. Also armature and magnet wiring of every description. Our readers interested should write to C. F. Splitdorf, 23 Vandewater street, New York.

The Davis & Egan Machine Tool Company, Cincinnati, Ohio, have ordered from the Pond Machine Tool Company, of Plainfield, N. J., one of their latest pattern 72-inch square planers, with four heads, and 40-foot table. This will be one of the longest planers running in this country. It will be installed in their new plant at Covington, Ky.

The Cabinet Manufacturing Company, formerly of Ashtabula, Ohio, are now installed in their new and modern plant at Steubenville, Ohio, and, with the recent change in management, promise every customer the finest of goods, with promptness of fulfillment and the pleasantest of business relations. Telephone wood work in all its branches is their specialty. They request trial orders. Address them at Steubenville, Ohio, hereafter.

M. C. Henry & Company, of New York city, are enlarging their plant and making some extensive improvements. Their new steel stone shed, which is about 50 feet wide, is to be extended about 70 feet in length. The metal work, which consists of the steel framework of the building, the covering upon the roof and sides, and the metal runway for traveling crane, is being furnished and erected by the Berlin Iron Bridge Company, of East Berlin, Ct.

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"THE NIAGARA FALLS ROUTE."

If you want to learn all about California, its resorts, and how to reach them, address W. H. UNDERWOOD, G. E. P. Agt., 319 Main St., Buffalo, N. Y.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED MARCH 1, 1898.

599,692 Electric switch; George Doyle, Brookline, Mass.—Consists of a movable member comprising conducting pivoted blades, and a tie bar connecting said blades together, of a handle attached to said tie-bar to move therewith, a locking device to engage said tie-bars, and secure said movable member in its closed position, a releasing device operated by movement of the said handle, and means to move said movable member into its open position when unlocked.

599,718 Plate for accumulators; Wilhelm Majert, Grunau, Germany—An accumulator plate comprising the plate or bar having corrugations therein of substantially the shape of the half of a cone when divided on the line of its axis.

599,781 Current collecting device; Ludwig Gutmann, Peoria, Ill.—A brush for dynamo electric machines, consisting of a body portion of gauze conductor, a strip of insulating material, and a superposed stratum of conducting material electrically connected with the gauze at one extremity of the brush.

599,789 Transformation of alternating currents into direct currents; Adolph Muller, Hagen, Germany.

599,791 Electric motor; O. H. Pieper and A. F. Pieper, Rochester, N. Y.—A shunt-wound electric motor, consisting of a main switch for controlling the current to the field and armature, and resistance between one of the leading-in wires and the machine circuits, a switch actuated by the main switch and contacts co-operating therewith arranged and operating to short circuit the field and armature before breaking the main circuit by means of the main switch.

599,800 Automatic electric door closer; Chas. E Scribner, Chicago, Ill.—A movable door, and an armature carried thereby, a fixed electro-magnet adapted to hold said armature, and an electric circuit through said electro-magnet including a source of current.

599,801—Toll-collecting device for telephones; C. E. Scribner, Chicago, Ill.—A coin chute provided with a socket for a coin, a finger adapted to grasp the coin when in the socket, means for releasing the coin from the pressure of the finger and a signal-sounding device operated by the finger when released.

599,803 Rheostat; S. H. Short, Cleveland, Ohio—A rheostat for street railway motors, consisting of a spider having radial arms adapted to receive the resistance material in spiral convolute layers there between, and means for attaching the motor circuit terminals to such resistance material.

599,804 Method of and means for controlling electric motors; S. H. Short, Cleveland, Ohio—The method of controlling motors which consists in maintaining a substantially constant or uniform accelerating current until the desired speed has been attained, and thereafter reducing said current thereby maintaining a uniform speed.

599,805 Method of and means for controlling electric motors; S. H. Short, Cleveland, Ohio—Consists in varying the windings in the motor field to maintain a substantially uniform accelerating current, and thereafter reducing the motor current to a point such as to maintain a uniform speed.

599,806 Method of and means for controlling electric motors; S. H. Short, Cleveland, Ohio—Consists in varying the relative connections of two or more motors to maintain a substantially uniform accelerating current, and thereafter reducing the current to a point such as to maintain a uniform speed.

599,807 Pneumatic controlling mechanism for electric railway cars; S. H. Short, Cleveland, Ohio—In a system of controlling motors in a train of cars, a controller for each car, fluid pressure mechanism for simultaneously actuating said controllers, and means mounted on each car of the train for controlling said fluid pressure mechanism.

599,810 Alternating current motor; Wm. Stanley, Pittsfield, Mass.

599,815 Varipolar motor or dynamo; H. H. Wait, Chicago, Ill.—Consists of varipolar fields, a plurality of independent armature windings, and separate commutators for the said independent windings.

599,818 Electric arc lamp; E. P. Warner and H. H. Wait, Chicago, Ill.

599,828 Electric railway; Wm. M. Brown, Johnstown, Pa.

599,862 Electrically-propelled vessel; Dan O'Flaherty, Kansas City, Mo.

599,867 Telephone transmitter; James H. Rogers, Bladensburg, Md.—A fixed electrode, a movable electrode mounted thereon, and having a projection entering the fixed electrode to hold it in place on the latter, and an elastic conical or skirt-like sounding board or target depending from the movable electrode.

599,868 Electric car trolley; W. H. Russell, Newcastle, Canada.

599,880 Electric arc lamp; Chr. Tepel, Bennett, Pa.

599,881 Magnetic closer; Jos. N. Thomas, Johnstown, Pa.—A magnetic closer having an extended pole adapted to supply a substantially continuous magnetic field throughout its length and composed of a plurality of sections insulated from each other.

599,891 Electric contact device; John L. Buchanan, Johnstown, Pa.—In an electric trolley device, the combination of a frame and a plurality of laterally-movable rollers carried thereby, and having flanges extending completely over the conductor.

599,892 Electric regulator for dynamos; W. H. Chapman, Portland, Me.

599,910 Incandescent electric lamp; John T. Lister, Cleveland, Ohio.

599,913 Electric motor; Edmund McNerney, Pittsfield, Mass.

599,929 Quick-break switch; H. P. Davis, Pittsburgh, Pa.—Comprises two stationary jaw terminals and an auxiliary jaw terminal having laterally yielding, resilient sides, with a blade provided with a tongue having a head at its free end for engagement with the auxiliary jaw terminal.

599,930 Switch for electric circuits; H. P. Davis, Pittsburgh, Pa.—A switch for electric circuits, comprising a stationary jaw terminal and a movable blade, having spring plates or washers riveted to its sides, the outer side faces of which make contact with said stationary jaw terminal.

599,931 Electric arc lamp; H. D. Davis, Pittsburgh, Pa.

599,932 Method of and apparatus for regulating electric motors; Budd Frankenfield, Madison, Wis.—The method of changing speed of an electric motor having two unequal armature windings, which consists in connecting said windings to the mains in conjunction and in opposition.

599,940 Non-synchronous electric motor; B. G. Lamme, Pittsburgh, Pa.

599,941 Direct current electrical machine; B. G. Lamme, Pittsburgh, Pa.—A filed magnet having inwardly projecting pole pieces provided with relatively narrow magnetic pole shoes which project laterally from the pole faces and serve to increase the width of the fringe of the magnetic field.

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Partnership Dissolved.

Notice is hereby given that the partnership between R. Barclay Twining and Stephen D. Large has this day been dissolved by mutual consent.

R. B. Twining is authorized to settle all debts due to and by the firm of Large and Twining. The business will be continued at 321 Chestnut Street by Stephen D. Large, under the firm name of Stephen D. Large & Co.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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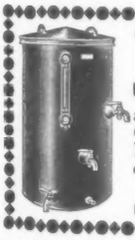

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Kindred.... ...Interests

The "Climax" Boiler, made by the Clonbrock Boiler Company, Brooklyn, is indorsed by every user. Thos. A. Edison, who has carefully tested the boiler, gives it highest praise.

The Ohio Electric Specialty Company, of Troy, Ohio, are placing a new line of rheostats on the market, consisting of automatic motor starting, dynamo field and motor speed regulating rheostats. They are of the highest grade material and are being successfully used on many large switchboards throughout the country.

The Western Electric Company is at present recommending an electric spud as a serviceable construction tool. This spud is in the nature of a digging bar, provided at one end with a braid of open-hearth crucible mining steel, and on the upper end an iron tamper, thus combining a digging bar and a tamping bar in one tool. The length of the spud is nine feet, and it digs three times as fast as an ordinary bar and is only half as heavy.

F. E. Homer & Company, of Cleveland, Ohio, manufacturers of the well known Homer commutators, report the largest business through the months of December and January that the firm has yet experienced. They have been compelled to keep a night force at work in order to fill several large orders recently received from Butte City, Mont., San Antonio, Tex., Salt Lake City, Utah, and Seattle, Wash. They have lately extended their plant, and are now occupying almost double the floor space formerly used. The firm are now engaged in executing a large order for commutators for a German firm, which they hope to have ready for shipment within a few weeks.

Decorative and Candelabra Lamps—Although a large number of series candelabra lamps are still in use, a growing tendency exists to employ these lamps in multiple on ordinary circuits, with the result that the wiring of fixtures is much simplified and the renewal of burned-out lamps rendered a much easier task. A full line of multiple candelabra lamps, as well as series lamps, is now made by the Edison decorative and miniature lamp department, which has just issued a handsomely illustrated catalogue, in which all the styles of series and multiple candelabra lamps, multiple sign lamps, series decorative lamps, and lamps for special uses, such as bicycle, telephone, dental, surgical lamps, and many others, are described. The department has also illustrated in this little work a complete line of receptacles and sockets for candelabra and miniature lamps. The catalogue is of interest, not only to all central station managers and dealers, but also to general customers, whether experimenter, physician or others using or likely to use lamps of this character. The catalogue may be obtained from the Edison decorative and miniature lamp department, General Electric Company, Harrison, N. J.

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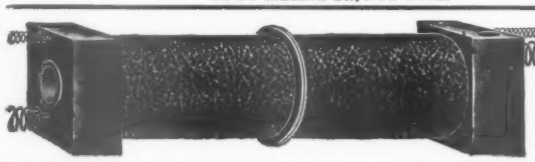
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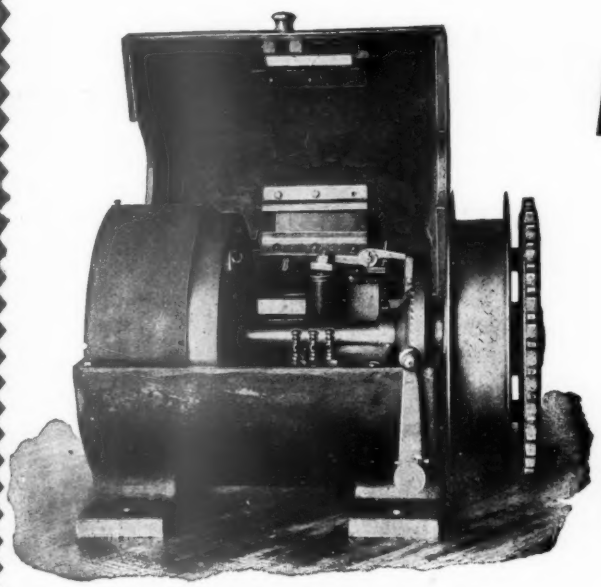

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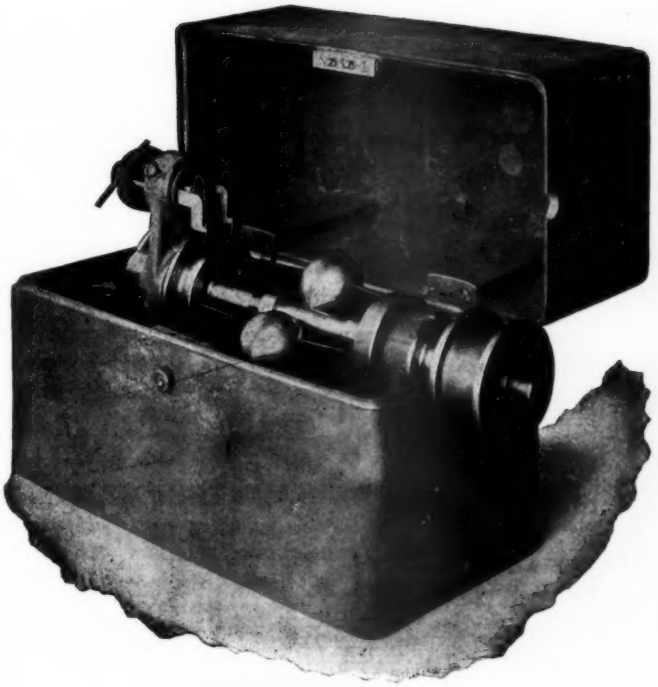

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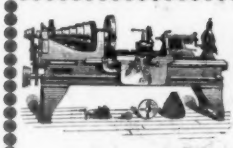

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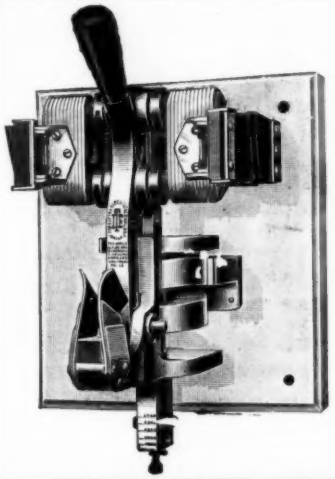

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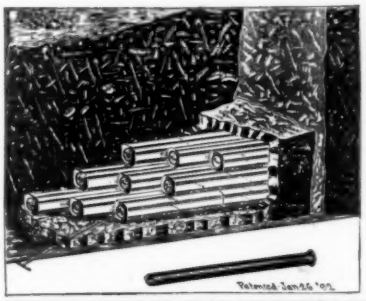

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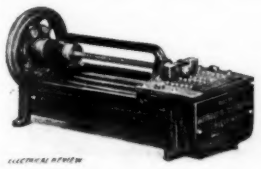

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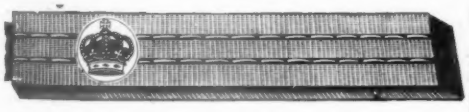

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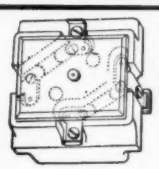

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Fig. 2.—Cover and Electrodes of Cell No. 1.

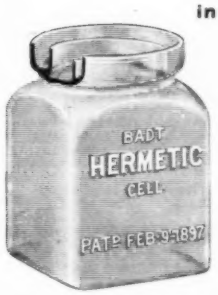

Fig. 1.—Jar without Cover.

Fig. 3.—Cover and Electrodes of Cell No. 2

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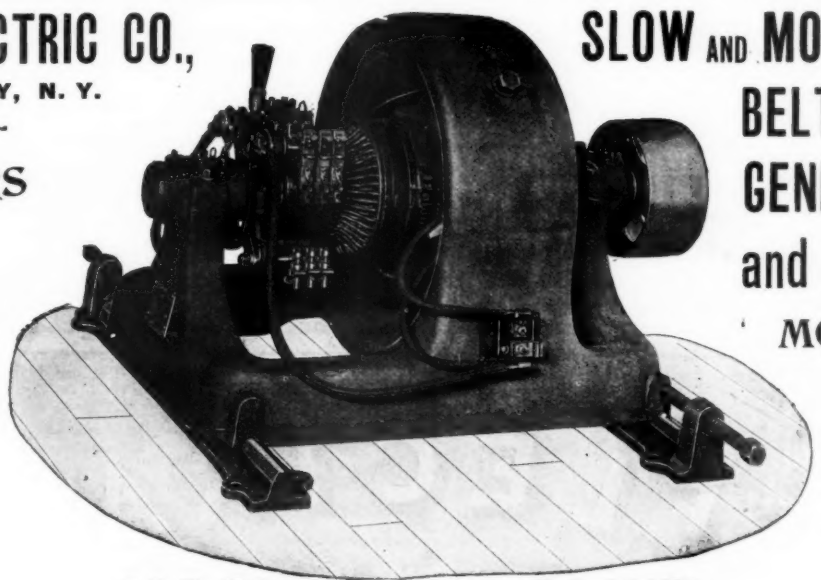

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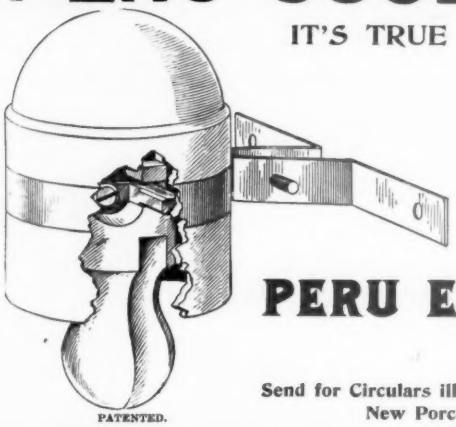

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